DOCUMENT RESUME

ED 134 467 SE 021 968

TITLE	SEED (Sites for Environmental Educational Development) Project No. F4-73051.
INSTITUTION	Pennsylvania State Dept. of Education, Harrisburg.
SPONS AGENCY	Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
BUREAU NO	F4-73051
PUB DATE	[76]
NOTE	458p.
EDRS PRICE	MF-$0.83 HC-$24.77 Plus Postage.
DESCRIPTORS	Art; Elementary Secondary Education; *Environment; *Environmental Education; History; *Instructional Materials; Language Arts; Mathematics; Physical Education; Sciences; *Teaching Guides

ABSTRACT

This workbook provides a variety of activities that are multi-disciplinary in approach. Activities are included for both elementary and secondary school students. Teacher reference sheets usually include suggestions for the activities including concepts, objectives, pre-activities, activity procedures, and post-activities. Content areas include history, physical education, nature, math, science, language arts, and art. Many of the activities emphasize outdoor study. (RH)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED134467

U.S. DEPARTMENT OF HEALTH
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

SEED

SITES FOR ENVIRONMENTAL EDUCATIONAL DEVELOPMENT

PROJECT NO. F4-73051

ESEA Title III

2

SE 021 968

SEED

SITES FOR ENVIRONMENTAL EDUCATIONAL DEVELOPMENT

PROJECT NO. F4-73051

The work presented or reported herein was performed pursuant to a grant from the Pennsylvania Department of Education acting as the State Educational Agency for the United States Office of Education, Health, Education & Welfare. However, the opinions expressed herein do not necessarily reflect the position or policy of the Pennsylvania Department of Education or the United States Office of Education and no official endorsement by either should be inferred.

Contents

PAGE MODULE TITLE

4 How to use this workbook
6 Area location map
7 Site description for Jacobsburg State Park Natural Area
11 Site Location Map for Jacobsburg State Park Natural Area
12 Acknowledgements

HISTORY

18 A Jacobsburg Chronology
20 Historic Site Descriptions
22 Historic Site Map
24 Locating Historical Sites
26 Colonial Living in Jacobsburg
30 Early Manufacturing
33 Archaeology

PHYSICAL EDUCATION

44 Physical Fitness Trail
50 Trail Games

NATURE

54 Nature Awareness
56 Effects of Light
58 Mobility
60 Shapes & Patterns
62 Homes in the Woods
64 Water Life
66 Biotic & Abiotic Factors
67 Nature Appreciation
78 Physical Changes
84 Succession

MATH

90 Computing
94 Contour Mapping
100 Maps & Graphs
114 Compass Use
118 Measuring Stream Flow

SCIENCE

138 Introduction to Science Modules
140 Area Science Site Description
150 Comparing Plaots in A Forest
152 Stream Survey
158 Succession on Bare Rock

PAGE MODULE TITLE

162 Stream Profile
165 Constructing a Cruising Stick
169 Study of a Decaying Log or Stump
173 Food Web in a Stream or Pond
177 Line Transect Study
180 Science Along the Trail
190 Food Chain
194 Communities in Nature
200 Soils Awareness
204 Soil Erosion
206 Soil - profile, land use, quadrat study

LANGUAGE ART

218 Bee Tree
222 Expression & Discovery
232 Senses
240 Exercises to Increase Vocabulary Skills

ART

246 Arts & Trees
248 Texture
250 Color
252 Sensory Approach
255 Line & Shape
258 Nature's Patterns
263 Experimenting in Natural Colors
268 Effect of Man on the Environment
270 Colors in Nature
275 Animal Tracks
278 Experience in Color
281 Experience in Perspection
284 Sketching & Outdoor Appreciation
286 Movement & Energy
290 The Maze
292 Comparisons in Nature
293 Shapes & Patterns
294 Attitudes & Surroundings
295 Nature's Basic Elements
296 Constructing a Fresh Water Environment
297 Problem Solving
298 Art Appreciation Through a Camera Lens

How to use this workbook...

SEED
ESEA Title III
STUDENT
ACTIVITY
CATALOG

The materials presented in this book were adopted by a team of forty-eight teachers from Colonial Northampton Intermediate Unit 20 in pursuant of an ESEA Title III Grant from the Department of Education and are adopted for the Natural Area of Jacobsburg State Park.

The purpose of preparing the modules was not to create any new material, but rather adopt what has already been written to the local level using Jacobsburg State Park as the resource. It is hoped that these materials will not be limited in their use to the State Park Site, but will be carried back to local schools and found helpful when utilized to fortify ideas and concepts at school sites and in local communities.

The Material

Materials have been prepared in two forms:

TEACHER REFERENCE SHEETS which are the main body of the book. They are multi-disciplinary in their approach and have suggested activities that help make each module useful in several curriculum areas. These are not intended to be the only activities that can be done in any of the areas, but are simple guidelines to help convey the concept. Any activity, regardless of its intended use, can be utilized in a variety of situations. These reference sheets are intended to help guide teachers in the main objects and concepts of the learning experience.

STUDENT ACTIVITY SHEETS which are intended to assist students carry out the activities of the module while in the field. They are in the folder section in the back of the book and can be reproduced to give to each student to use for notes and any additional directions that the teacher may have for them. The purpose of student sheets being separate and in the back of the manual is so they can be easily taken out. The proper activity sheet can then be reproduced.

Equipment - Bushkill Township Elementary School (215) 759-1118

The equipment needed to carry out the modules is listed with each module and can be checked out by teachers. Until Jacobsburg State Park becomes an operational park, the materials needed to aid in teaching these modules can be checked out from the Bushkill Township Elementary School, which borders the park. Personnel at the school will make the material available between the hours of 8:00 A. M. and 3:30 P. M. An equipment inventory list is available with the student activity sheets. If you will telephone the school several days prior to your field trip and let them know the material you will need and when you need it, they will have it ready for you to pick up.

When Jacobsburg becomes an operational park in several years, the material will be available from the Park Office.

Transporting Equipment

There are fifteen pack baskets available for use in carrying equipment to the park site. It is exciting for students to assist with carrying materials and the baskets are intended to be used for that purpose.

Reference Center

There is an inventory of reference materials available at the Bushkill Township Elementary School for use by students while in the field. These materials can be checked out at the same time as equipment.

Site Description Slides

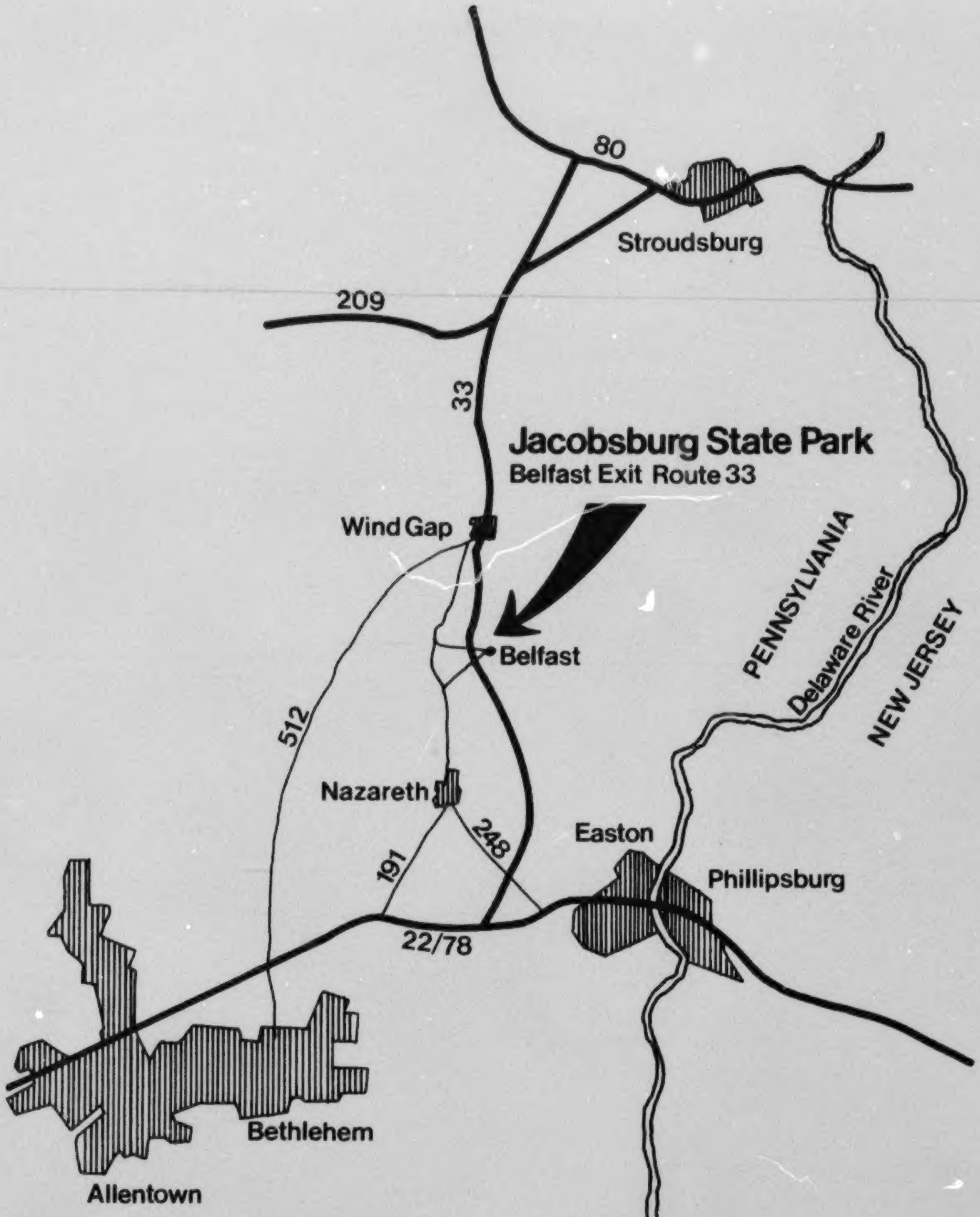
Carousel slide sets with scripts are being produced. These will be available from the Colonial Northampton IMS to describe the sites at the State Park and their uses for each of the content areas: History, Language Art, Art, Nature, Science and Mathematics. Their intended use is for pre-field trip orientation so teacher and students can be made aware of the Jacobsburg State Park Natural Area before the field study experience.

Resource Persons' Career Opportunity

Slide presentations have been prepared on the job opportunities and careers of many local resource people who are available to schools to use with classes.

These presentations include the cooperating agencies of the Northampton County Conservation District which are the Game Commission, Fish Commission, Cooperative Extension Service, Soil Conservation Service, Department of Environmental Resources, Bureau of Water Quality, Bureau of Forestry, Bureau of Parks, and the Executive Assistant of the Conservation District.

Area Location


80
Stroudsburg
209
33
Jacobsburg State Park
Belfast Exit Route 33
Wind Gap
Belfast
PENNSYLVANIA
Delaware River
NEW JERSEY
512
Nazareth
248
191
Easton
Phillipsburg
22/78
Bethlehem
Allentown

Site Descriptions

Site 1

This is the area just beyond the foot bridge that crosses the stream from the parking lot. It includes the open field on the left as you cross the foot bridge and the large red oak tree that stands to the left as you start down the trail, as well as the flat, brushy area that is between the trail and the stream.

Site 2

Walking down the trail, Site 2 extends from beginning of the hemlock forest to where the high rock wall begins on the west side of the stream. A large rock showing signs of stream erosion protrudes from the wall at this point. This area of the old floor plain and stream can serve as a focal point for many outdoor education activities.

Site 3

This is the area that includes the second half of the dominant hemlock stand that is so evident along the stream. This site ends where the stream begins to widen.

Site 4

As you proceed down the trail from Site 3, this area begins at the end of the hemlock stand and is characterized by deciduous forest. It takes in both sides of the trail as it leads you up the hill and ends at the small open area near the top of the hill where the trail branches and the main trail bends right toward the top of the old valley wall.

Site 5

The main trail takes you to the top of the old valley wall on the northeast side of the creek. A bedrock outcrop forms the bottom of the stream bed and a hemlock stand dominates the top of the valley wall.

Site 6

Indian Cave and bee tree. Take the trail from Site 5. An excellent view of the upper dam, islands and horse race is seen from this lookout.

Site 7

Ice House Foundation. This foundation is a good area for students and teachers to gather for a discussion as the site is flat and relatively clear of woody plants.

Site 8

This is the old dam site located at the confluence of the tributary and Bushkill Creek.

Site 9

This site includes the Mill Race and the area on both sides of the Mill Race. Many black walnut trees are found in this area.

Site 10

Located off the Mill Race is a small manmade pond which resulted from an attempt in the past to quarry slate.

Site 11

The field located to the left of the Mill Race off the main trail is an ideal site if large groups of students are involved. They have ample room to spread out and conduct a variety of outdoor education activities.

Site 12

Boulton Gun Factory was built in 1812 and destroyed in 1945. The first gun was made in 1812 and the last gun in 1904. Used after 1904 to 1922 as a reclaiming factory for burlap cement bags for Nazareth area cement mills. Remains today show outline of foundation and last cement pile from the bag cleaning operation. Metal detector might show many artifacts still in the area.

Site 13

Using the abandoned road on the western shore of the Bushkill Creek, which is northeast of the bridge on Henry's Road, one will encounter an abandoned orchard. Continuing on this road (part of which is a natural slate roadbed), a second clearing is reached. This is an open area showing succession and a return of the natural environment.

Site 14

Site 14 is reached by proceeding from the center of Site 3, up the slope toward the opening in the tree line. The elevation is approximately fifty feet higher than that of Site 3 and offers a panoramic view of the location and distant ridges.

Site 15

Follow the path from the end of Site 14 for approximately 150 yards into the wooded area. The site is characterized by a steep bank tilted at approximately forty degrees overlooking the flood plain. Observations can be made on the effects of light, temperature and erosion on the growth of the surrounding environment.

Site 16

John Joseph Henry House - Built by Hahn before 1790, bought in 1790 by William Henry II. Later Henry descendants lived in neighboring houses. Although renovated many times, the original log walls can be seen in the attic. Note spring in the back used to bring water into the house. Carriage House just east of the residence can also be seen. This area will be set up as a museum by the Jacobsburg Historical Society. The old Henry Estate is an excellent site to compare texture, color, changes in nature through art. The large trees and the variety of them can be used for art lessons, as well as the architecture of the old Henry Estate compared to modern time.

Site 17

Benade House, 1809 - Two and one half story stone house, numbered in attic, homemade nails, wood peg and tongue construction, excavating in cellar to get down to the original basement level. Spring house off to the side with flowing spring in the basement.

Blast Furnace - 1808, first bar iron made in Northampton County, found on creek east of the Benade House. Built and operating in 1808. Blast furnace powered by undershot wheel. Ruins hard to find; local deposits of hematite and limonite were used.

Slate Quarry - one of the earliest in Northampton County, operating from 1811 to the 1930's, found across the creek to the east of the blast furnace.

Site 18

Master's House, Boarder's House, and Blast Furnace in Jacobsburg were all built in 1824 by Matthew Henry. It is located uphill from the Tannery excavation. Charcoal deposits can be found here. The foundations and wells for Master's and Boarder's Houses are still visible.

Site 19

Tannery - Built in 1824 and in operation until 1833. The outline of wooden vats and building are being excavated by Jacobsburg Historical Society. The growth of hemlocks in the area provided the tanic acid necessary in the tanning operation.

Barrel Boring Mill - Built in 1792 and hand operated. Barrels were still made here after Boulton Gun Factory was built where they were transferred to be finished.

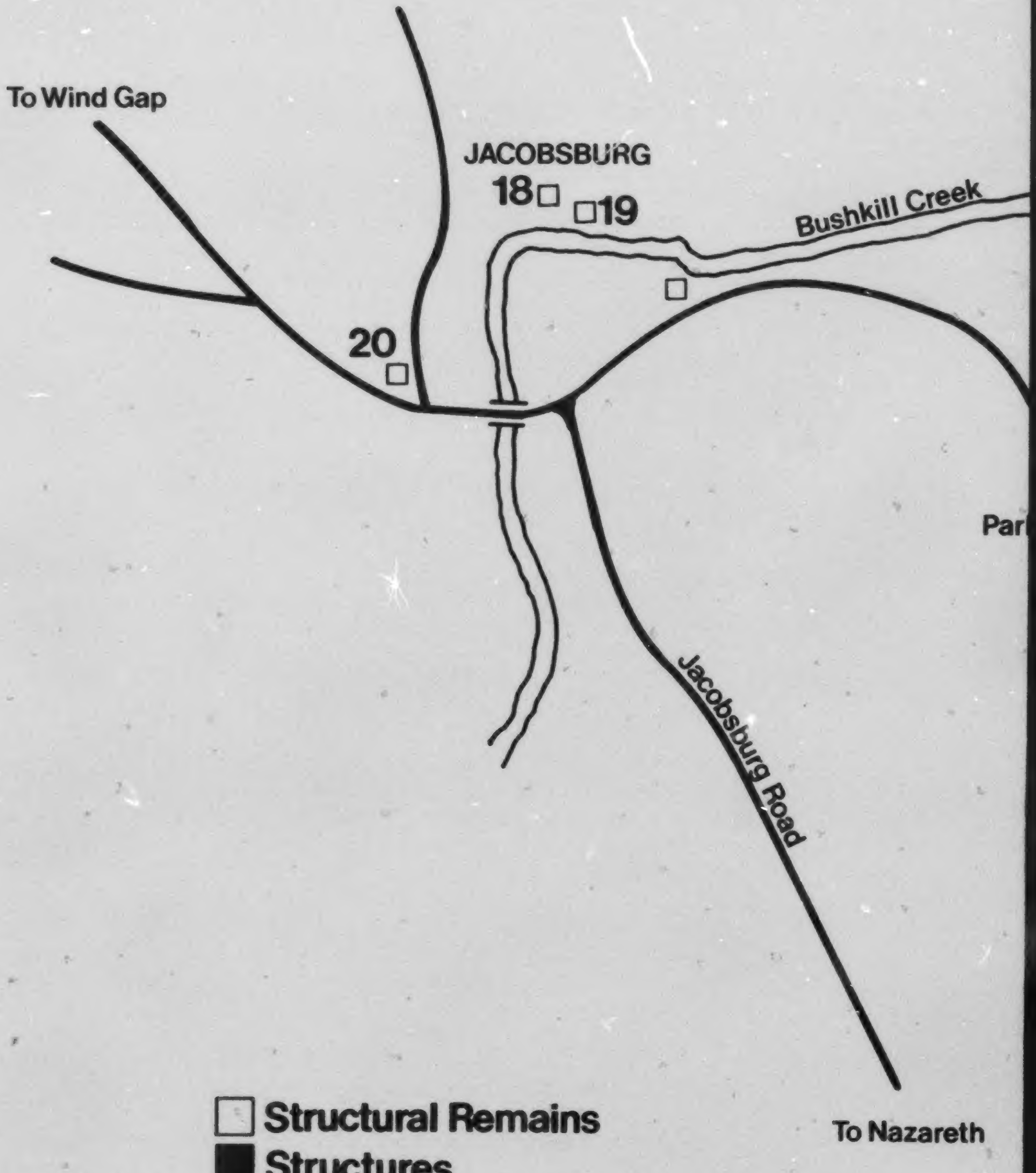
"Iron Ore Alley" - Remains of hematite, charcoal, limonite and slags show area to be a dumping ground for wastes of the Blast Furnace.

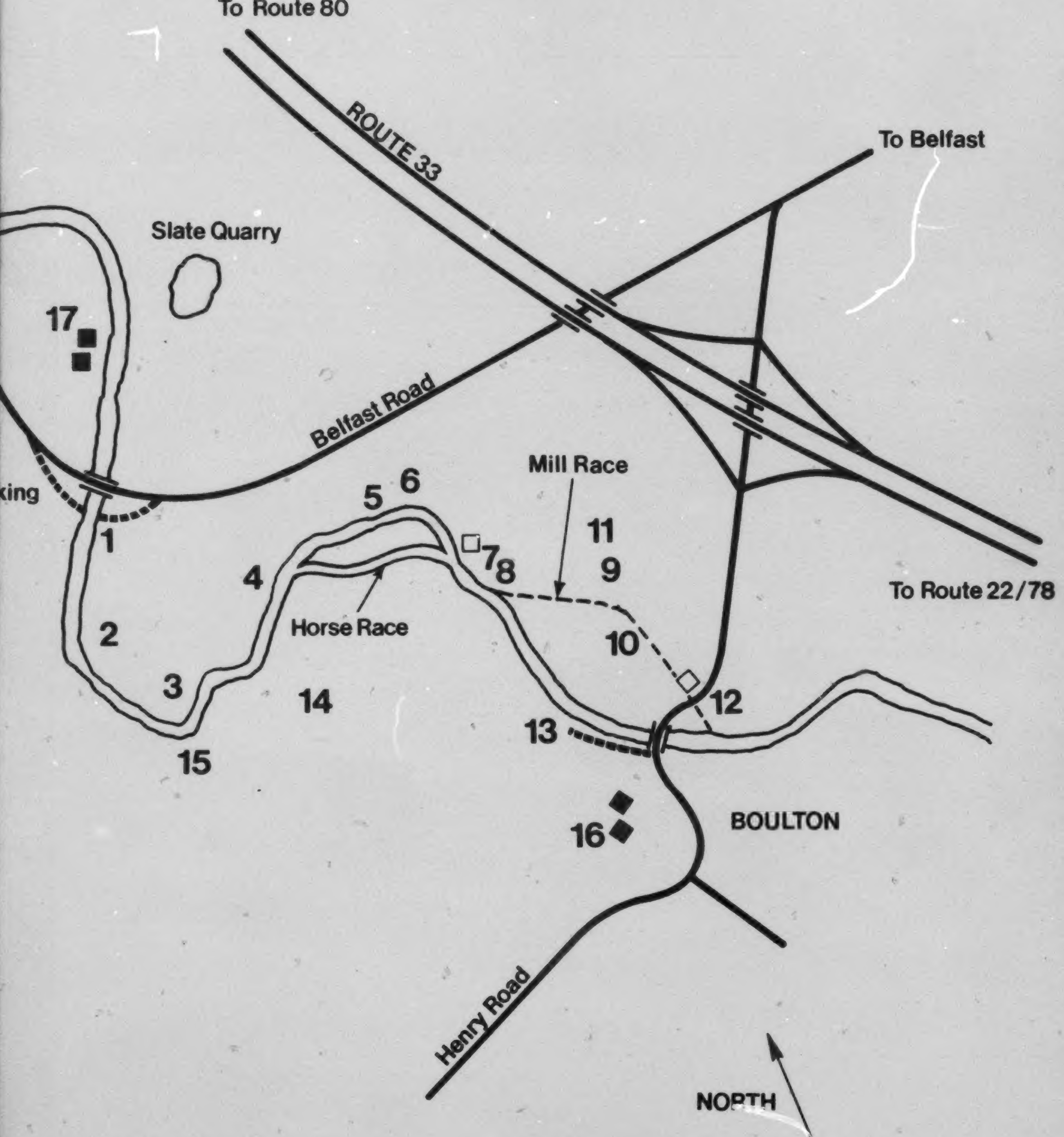
Spring - Drinking water supply for area residents.

Site 20

Jacobsburg Hotel - foundation and well still visible. Stopping place on stage coach route between Philadelphia and Wilkes-Barre in 1755 to 1913. The decline was due to moving the major highway east to the Sullivan Trail and the coming of the Slate Belt Electric Trolley also to the east.

Site Locations


To Wind Gap
JACOBSBURG
18
19
20
Bushkill Creek
Par
Jacobsburg Road
To Nazareth
☐ Structural Remains
■ Structures


To Route 80
ROUTE 33
To Belfast
Slate Quarry
17
Belfast Road
Mill Race
king
1
5
6
11
7
8
9
4
To Route 22/78
Horse Race
2
10
3
14
12
13
15
BOULTON
16
Henry Road
NORTH

Acknowledgments

This ESEA Title III Project has been made possible only by the cooperation of an entire community of people interested in developing an environmental education ethic that could be passed on to its young people in an effort to help them more easily relate their existance with that of their environment.

The efforts of the following organizations and individuals helped make this unique opportunity possible. We are grateful to the:

Northampton County Conservation District for their initiation and cooperation in the implementation of this environmental education program.

Jacobsburg Historical Society for sharing much of their research and knowledge of the history of the area with educators.

Bushkill Watershed Association whose counsel and support have been a key factor.

Northampton County Area Community College for the use of their facilities during workshops.

Bushkill Township Elementary School for allowing their facilities to be used as a meeting place and workshop center for many of the activities of the project.

Colonial Northampton Intermediate Unit 20 for their sponsorship of the proposal and cooperation in the administration.

Bureau of Parks of the Department of Environmental Resources for their cooperation in allowing an area of Jacobsburg State Park to be set aside as a natural area and used as a resource for training professional educators.

Penn State University Cooperative Extension Service for allowing a member of their staff the time to direct the project and The Continuing Education Staff of the University for the credit situation for project participants.

Nolde Forest State Park for their staff's direction, guidance and consultation throughout the entire project.

Environmental Steering Committee who was the driving force that gave the project its original lift towards reality. The members of that committee volunteered their time to meet on several occasions.

Northampton County Commissioners for providing the project with space for an office and a secretary.

Department of Environmental Resources for their input from many levels ranging from Bureau of Parks, Bureau of Forestry and Bureau of Water Quality.

League of Women Voters for their interest in environmental education and impetus given the steering committee.

We need also to express appreciation to the following individuals for their contribution; be they great or small, all were an important link in putting all the pieces together. Thanks to:

Stephen Rituper, Jr., Science and Mathematics Curriculum Coordinator for Bethlehem Area Schools and Urban Director for the Northampton County Conservation District, for writing the project and providing continued guidance to the Project Director throughout the course of activities.

Donald P. Fowler, County Agent with the Northampton County Cooperative Extension Service, for directing all project activities and coordinating the efforts and talents of the many agencies and individuals involved in the project.

Ruth C. Coletti, secretary to the project, for her endless hours of clerical assistance that kept the project functioning.

Roslyn M. Kahler, Executive Assistant for the Northampton County Conservation District, for his persistance in seeing that Jacobsburg State Park remain a top priority issue of the Conservation District until it became a reality and maintained it as such throughout the coordination and development of environmental education programs.

Lou Ritrovato, Chief, Environmental Education and Interpretive Services Section with the State Bureau of Parks, for his cooperation and consultation from the State Park level and program presentation at the Resources Workshop.

Dr. Jerry Elliott, Professor of Recreation and Parks at Penn State, for his guidance to the project director and the sharing of his time with the Environmental Education Steering Committee when the total plan was in its infancy.

George Ward, Instructor of Outdoor Education at the Pennsylvania State University, for his workshop presentation during the orientation stages of the project. His day long program gave invaluable momentum and guidance to teachers preparing to do module development.

Lyn Fleming, Graduate Student in Recreation and Parks at Penn State, for her consultation with the teachers developing mathematics modules.

Albert Toth, local historian, for the unselfish sharing of his knowledge of area history. Much of the research of his past fifty years has become the focal point of the history portion of this project and the basis around which much of the project's future will evolve.

Dr. Donald Cadwell, Professor of Geology at Lafayette College, for his invaluable consultation that was so greatly appreciated by the teachers.

Lee Sprankle, DER Bureau of Forestry, for his assistance in the Resources Workshop and his consultant services to teachers involved in the project.

Richard Anderson, District Game Protector with the Pennsylvania Game Commission, for availability as a resource person for the orientation workshop and his continued availability as a program resource person to schools.

Mrs. Frederick Gilmartin, art instructor, for her consultant services to teachers developing art modules.

John Sopko, IMS Coordinator for Colonial Northampton Intermediate Unit 20, for his liaison assistance between the Intermediate Unit, the project and Department of Education, on budgetary matters relating to the project.

Raymond Todd, Director of the Colonial Northampton Intermediate Unit 20, for his consent in allowing the Intermediate Unit to be the sponsoring organization of the grant.

Leland Cramer, Colonial Northampton Intermediate Unit 20, for his assistance as liaison person for the Intermediate Unit to the project director and coordinators.

Robert Schwille, Pennsylvania Department of Education, for his direction during the beginning of the project and program presentation at the project orientation workshop.

Hilary Vida, Coordinator for Interpretive Services, Environmental Education and Interpretive Services Section, Bureau of Parks, for his assistance as consultant for developing project objectives within State Park regulations.

F. Dan Hite, Superintendent of Jacobsburg State Park, for his assistance and coordination at the local State Park level.

Kenneth McGeary, Director of Continuing Education at the Allentown Campus of Penn State University, for arranging the credit situations for teachers working with the project.

John Zolomij, Nolde Forest State Park, for his consultant services to teachers in the area of nature and science.

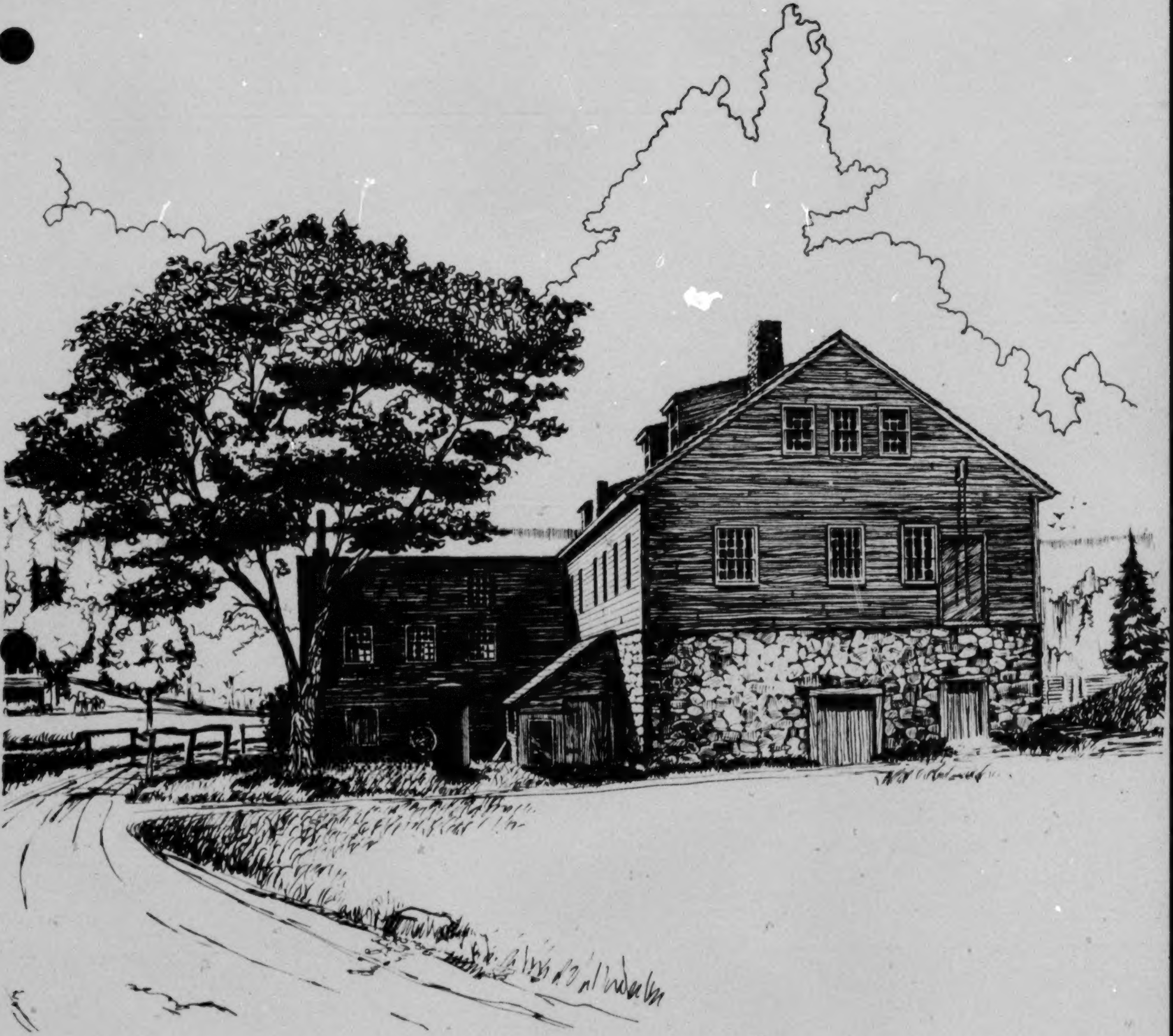
David Tindall, Soil Conservation Service, for his orientation workshop presentation.

Barry Jones, Consultant, for the preparation of modules for printing, for art work, and for guidance in assembling this workbook.

To the following 48 teachers for their cooperation throughout the first year of the project. It was their dedicated efforts in preparing modules, photographing, surveying and researching that made the entire program possible. We hope that all who use these materials share their experiences with others and will use it as a workbook rather than one for reference.

Irene A. Anthony	Allentown Diocese
Elizabeth A. Burak	Bethlehem Area School District
Robert P. Burak	Bethlehem Area School District
Bernard H. Cole	Northampton Area School District
Frank R. Creazzo	Easton Area School District
Daniel F. Eno	Scranton Diocese
John M. Gabriel	Allentown Diocese
Robert W. Gehman, Jr.	Nazareth Area School District
Ronald Gori	Northampton Area School District
Ruth B. Guida	Pocono Mountain School District
Dennis G. Hahn	Nazareth Area School District
Robert T. Hilyard	Bangor Area School District
William V. Hissam	Bethlehem Area School District
Nancy J. Hydusik	Bethlehem Area School District
Helen M. Irvine	Bethlehem Area School District
Richard B. Jones	Pen Argyl Area School District
Daniel Kasperkoski	Easton Area School District
Marlin W. Klinger	Wilson Area School District
Stan Komosinsky	Easton Area School District
Charles J. Kopcho	Pen Argyl Area School District
Michael P. Lenda	Easton Area School District
James A. Lindenmuth	Bethlehem Area School District
Ann D. Lipari	Intermediate Unit #20
John J. McKay	Pen Argyl Area School District
William A. Metzgar	Bethlehem Area School District
Jean M. Mikletz	Saucon Valley School District
Stephen S. Miller	Easton Area School District

Thomas P. Mindler	Bethlehem Area School District
Robert J. Mugione	Wilson Area School District
Gregory L. Naudascher	Bethlehem Area School District
Eugene P. Nealon	Intermediate Unit #20
Gerald J. Newhart	Northampton Area School District
Michele E. Parvensky	Nazareth Area School District
John E. Podwika	Nazareth Area School District
Joan M. Quinnan	Allentown Diocese
Mary Jane Rauch	Saucon Valley School District
Kim M. Ritchie	Intermediate Unit #20
Charles A. Romanell	Bethlehem Area School District
Dean L. Sadowski	Saucon Valley School District
Charles M. Sandwick, Jr.	Bangor Area School District
Ingrid A. Simke	Nazareth Area School District
Marlin A. Smickley	Northampton Area School District
Rose M. Smith	East Stroudsburg Area School District
John H. Strouse	Wilson Area School District
Donald L. Sysko	Wilson Area School District
Karen L. Voda	Wilson Area School District
Glenn L. Warmkessel	Bethlehem Area School District
Edward M. Zamiskie	Saucon Valley School District



The Boulton Gun Works

© 1974 Barry Jones

A Jacobsburg Chronology

William A. Metzgar

400,000,000 B. C.

The clays that formed the Martinsburg shales were deposited on the ocean floor.

250,000,000 - 200,000,000 B. C.

Mountain building occurred. The continent of "Appalachia" was born. Some shales were metamorphosed into slates. Pockets of iron-bearing minerals collected in fractures and fissures.

100,000,000 B. C.

Secondary uplifts and faulting formed the offsets and gaps along the Kittatinny Mountain.

600,000 B. C. - 8,000 B. C.

Glacial period. Early glaciers covered the area as far as South Mountain. The Wisconsin glacier, 70,000 - 8,000 B.C. covered the area north of Jacobsburg. The Bushkill Creek formed from meltwaters descending from the outwash plain. Quartz deposits in the stream date from that time.

7,000 - 4,000 B. C.

Approximate arrival in the area of Lenni-Lenape (Delaware) Indians. The Minisink Subtribe, about 3,000 B. C., constructed a village south of the location of Portland, Pa. Indians traveled through, hunted and traded in this area. The Jacobsburg Road follows an Indian trail, which became the main road during colonial times, from Philadelphia to Wilkes-Barre.

1740

Jacob Hubler settled in what was named Jacobsburg after him. His log cabin was located 100 m. south of the site of the Jacobsburg Hotel, which he built around 1750 along with a blacksmith shop and livery stable.

1790

William Henry purchased a log house from the Hahn family.

1792

William Henry built a gun factory in Jacobsburg (later became grist mill).

1808 - 1809

William Henry built a forge and made the first bar iron in the county. Site is behind the Benade House.

1812 - 1813

Slate quarried on land of William Henry. Quarry was still equipped in 1937.

Boulton Gun Manufactory built by William Henry II about one mile from Jacobsburg.

1814

Dam built for gun factory's water power supply.

1824 - 1825

A blast furnace, (pig iron and stove castings), tannery, master's house (for furnace), boarders' houses were constructed in Jacobsburg. The furnace closed in 1840. The tannery was probably the largest of its kind in the United States at that time. (Also known as Catherine Furnace)

Late 1800's

Construction of ice houses located at the dam. They supplied ice for Boultan, Belfast and Jacobsburg.

1904

Last shotgun made at Boulton Gun Manufactory.

1904 - 1922

Gun factory used to reclaim and repair and clean cement bags for the local cement plants.

1913

Jacobsburg Hotel was torn down.

1936

Gun factory dam broke. The cause was heavy spring rains coupled with the sudden melting of a heavy snowfall.

1945

Gun factory was demolished.

Historic Site Descriptions

Gerald J. Newhart

Note: An * means the site is still visible today.

Site 6 *Indian Cave - A weather shelter for traveling Indians overlooking the area of upper dam, islands and the "horse race". (See map)

Site 7,8 Dam and Ice Houses

*A. Dam - Held back water to create water flow through the Mill Race. Destroyed in 1936 during a flood. Dam site still visible. Built in 1814.

*B. Ice Houses (upper and lower) - In use during the winter and stored for summer use. Remains of the upper ice house still visible today. (See map).

Site 9 Black Walnut Grove and Mill Race

*A. Black Walnut Grove - Planted as a supply of high quality hard wood for gun stocks. Before this time, maple was used.

*B. Mill Race - Supplied water from the dam to operate overshot water wheel and later, water turbine at the Boultan Gun Factory.

Site 12 Boulton Gun Factory

*A. Gun Factory - Built in 1812, destroyed in 1945. First gun made in 1812, last gun in 1904. Used after 1904 to 1922 as a reclaiming factory for burlap cement bags for the Nazareth area cement mills. Remains today show outline of foundation and the last cement pile from the bag cleaning operation. Metal detectors might show many artifacts still in the area.

B. William Culver House - Some of the workers lived and boarded in the area. The William Culver House stood near the factory toward the east along side of the road.

Site 16 *John Joseph Henry House - Built by Hahn before 1790, bought in 1790 by William Henry II. Later, Henry descendants lived in neighboring houses. Although renovated many times, the original log walls can be seen in the attic. Note the spring in the back used to bring water into the house. Carriage house just east of the residence can also be seen. This area will be set up as a museum by the Jacobsburg Historical Society.

Site 17 Benade House, Blast Furnace, Slate Quarry

*A. Benade House, 1809 - 2-1/2 story stone house, numbered beams in the attic, homemade nails, wood peg and tongue construction, excavating in the cellar to get down to the original basement level. Spring house off to the side with flowing water in the basement.

B. Blast Furnace, 1808 - First iron made in Northampton County, found on the creek east of the Benade House. Built and operating in 1808. Blast Furnace powered by undershot wheel. Ruins hard to find. Local deposits of hematite and limonite were used.

*C. Slate Quarry - One of the earliest in Northampton County, operating from 1812 to the 1930's. Found across the creek to the east of the Blast Furnace.

Site 18 Master's House, Boarder's House, Blast Furnace (Catherine Furnace)

All built in 1824 by Matthew Henry. Found uphill from the Tannery excavation. Charcoal deposits can be found. Foundations for Master's and Boarder's Houses still visible.

Site 19 Tannery, Barrel Boring Mill, Iron Alley, Spring

*A. Tannery - Built in 1824, in operation until 1833. Outline of wooden vats and buildings being excavated by Jacobsburg Historical Society. Growths of hemlocks in the area provided the tanic acid necessary in the tanning operations.

*B. Barrel Boring Mill - Built in 1792, hand operated. Barrels still made here after Boultan Gun Factory was built. Barrels transferred to factory to be finished.

*C. Iron Alley - Remains of hematite, charcoal, limonite, and slaggs show area to be dumping ground for wastes of the Blast Furnace.

*D. Spring - Drinking water supply for area residents.

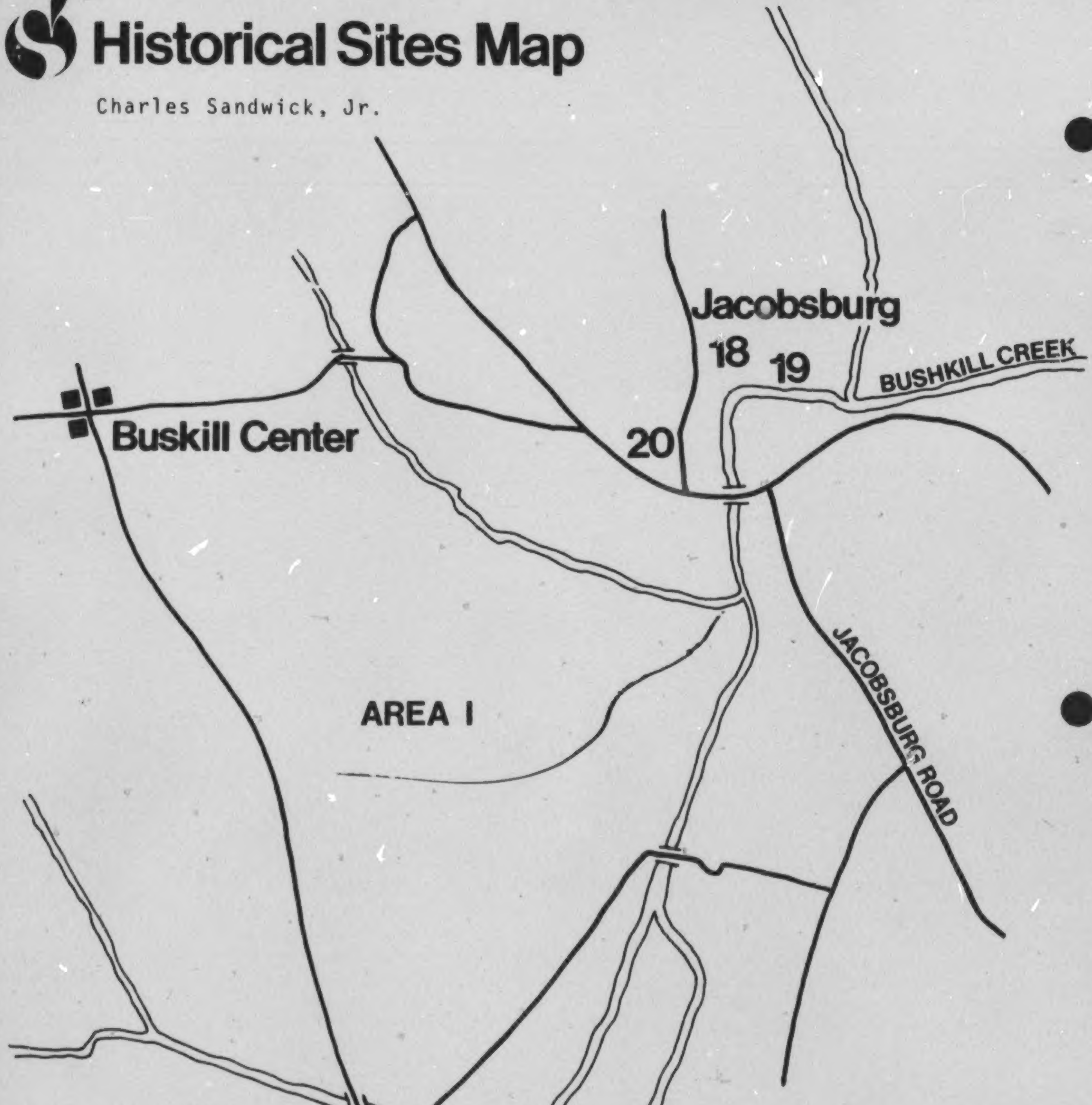
Site 20 Hotel, Blacksmith Shop, Livery Stable

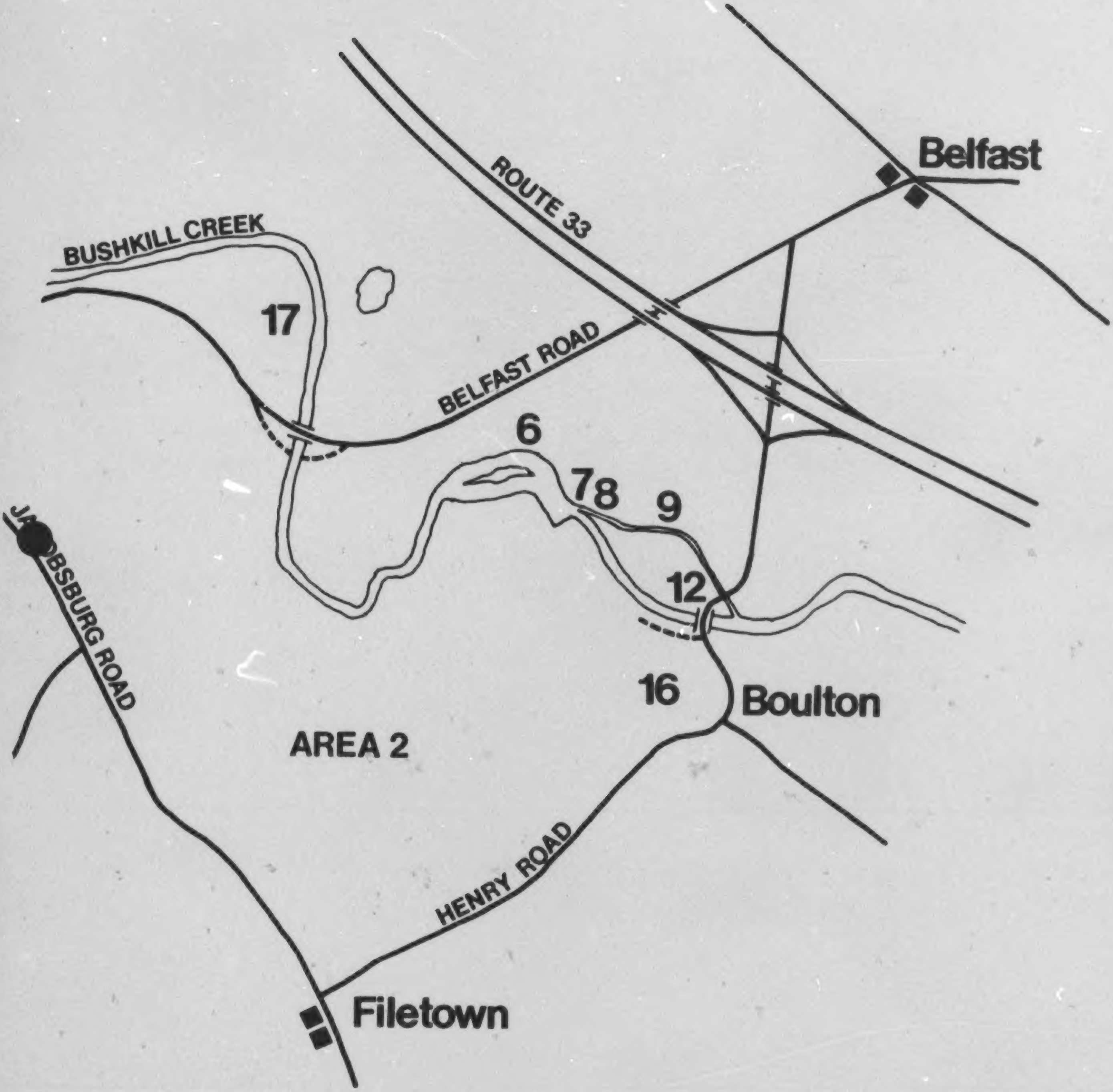
*A. Jacobsburg Hotel - Foundation and well still visible. Stopping place on stagecoach route between Philadelphia and Wilkes-Barre, 1755 to 1913. Decline due to moving the major highway east to the Sullivan Trail and the coming of the Slate Belt Electric Trolley to the east.

B. Note - Twenty rods south of the hotel was the first house of Jacob Hubler built in 1740.

Historical Sites Map

Charles Sandwick, Jr.


Jacobsburg
18
19
20
BUSHKILL CREEK
Buskill Center
JACOBSBURG ROAD
AREA I
Aluta


Belfast
ROUTE 33
BUSHKILL CREEK
17
BELFAST ROAD
6
78
9
12
16
Boulton
JA OBSBURG ROAD
AREA 2
HENRY ROAD
Filetown

Locating historical sites.

John Podwika
Dennis Hahn

Grade 5,6 (intermediate)

CONCEPTUAL THEME

Students will be able to locate historical sites on maps through the utilization of ad priori learning (film) and on-site discovery.

OBJECTIVES

Upon completion of this activity, students will be able to:

1. Plot the six historical points on the map.
2. Demonstrate the ability to work in a group in an outdoor situation with maximum awareness and minimum disturbance of eco system.

Equipment and Materials

Unplotted maps
1 Large unplotted map
* Permanent markers
* Pencils

Film
Slides
Pictures
Compasses

PRE-ACTIVITIES

1. Teaching of map skills.

*2. Showing of Historical Committee film.

3. Showing of slides of Historical sites.
4. Grouping of students into site discovery teams.
5. Discussion of park rules and ecological ethics.

ACTIVITY PROCEDURES

1. Distribution of unplotted maps in parking lot.
2. Dispersal of groups with minimum supervision, into the park area to discover and plot the historical sites 6, 7, 8, 9, 12 & 16 through the utilization of map skills
3. After sufficient time, students will return to starting point and, due to safety factors, will proceed as a total group to historical site 17 for plotting.
4. The students will then report to parking lot.

POST ACTIVITIES

These activities may be done at Jacobsburg State Park or in the classroom depending on the time available.

1. Teacher will have large unplotted map available for group discussion and plotting of sites.

2. Topic for group discussion that may evolve from map study module

    A. Physical features

        (1) Importance of stream
        (2) Flora found in area
        (3) Rock and mineral deposits

    B. Colonial architecture

    C. Industrial adaptation

OTHER CURRICULUM AREAS

Math

Students may determine how far they have walked.

Art

Sketch sites as students think they might have been.

Language Art

Students might research local history and write reports about it.

Nature

Discovery of animals and their tracks.

Discovery of plant life.

*Available from Colonial Northampton Intermediate Unit IMS.

Colonial Living in Jacobsburg

William Metzgar

CONCEPTUAL THEME

The people living in any time period live according to their needs.

The life style of a group of people is controlled, in part, by their environment.

People learn to change their life style by modifying the environment to suit their changing needs.

OBJECTIVES

Through the activities and observations in this module, students will be able to:

1. Determine how local materials were used in the construction of buildings in Colonial Jacobsburg.
2. List materials necessary for living and determine how they were obtained.
3. Describe some of the changes observed in the construction of buildings through the passage of time.
4. Estimate some of the problems of survival the people living in Jacobsburg encountered.
5. Explain the decline of Jacobsburg.
6. Describe how nature is reclaiming the area.

/

Equipment and Materials

Map of history sites (one for each student)
Site descriptions of Sites 16, 17 and 20.
"A Jacobsburg Chronology" (one for each student)
A student activity sheet (one for each student)
* Paper, pencils, clipboard or notebooks (for recording observations)

PRE-ACTIVITIES

1. Using as many of the materials from the bibliography as are available, have students research material concerning the villages of Jacobsburg and Boulton, the Henry family and early iron-making and gun manufacturing in the area.

2. Using standard history texts and reference materials, have students research material concerning building construction in the period 1740 to 1840 and material concerning family life, work, clothing, food and other aspects of survival during the same period.

3. Preview with the students the map and site descriptions and slide presentation of the History sites.

How did the people of early Jacobsburg live in this area?

Sites

What to look for:

Site **16**	Construction of house Spring flowing into house Side buildings
Site **17**	Construction of house (numbered roof beams, hand-made nails, pegs) Spring house
Site **20**	Foundation and well

What to do:

1. Examine each site carefully and completely. Use your senses as completely as you can. Take your time. Nobody is rushing you through on a guided tour. Use your imagination; let it help your senses.

2. Locate each site on the map. Read the site data and material available in your packet.

3. Answer discussion questions from information obtained at the sites and with data sheets and maps.

4. Try to confirm discussion questions' answers using historical literature as listed in the bibliography and elsewhere. Your school and public library should have some materials.

Discussion questions

1. How were local materials used in the construction of homes and other buildings?

2. Certain materials are necessary for living. Make a list of these. From observing the sites and their surroundings, how were these materials obtained?

3. As time passed, describe some changes you have found in the construction of buildings.

4. What problems of survival did the inhabitants of Jacobsburg encounter?

5. Why do you suppose the population of Jacobsburg declined?

6. How is nature reclaiming the area?

Bibliography

Henry J. Kauffman. *The Pennsylvania-Kentucky Rifle*. Harrisburg, Pennsylvania; Stackpole Books, 1960.

The Northampton County Historical and Genealogical Society. *Northampton Heritage*. State College, Pennsylvania; Penns Valley Publishers, Inc., 1953.

Joint Planning Commission, Lehigh-Northampton Counties. *History of the Lehigh Valley Region*. November, 1963.

Matthew S. Henry. *Manuscript History of Northampton County, Pennsylvania*. Original in possession of The Historical Society of Pennsylvania. Philadelphia, 1851.

Dr. Richmond E. Meyers. *Lehigh Valley The Unsuspected*. Northampton County Historical and Genealogical Society. Bethlehem, Pennsylvania; Lehigh Litho, Inc., 1972.

POST ACTIVITIES

1. Repeat slide presentation having students recall and discuss their observations.
2. Discuss the students' answers to the discussion questions.
3. Acquire feedback from the students on the value of the module and ways to improve it.

OTHER CURRICULUM AREAS

Art

Sketches of the areas as they might have been.
Sketches of guns.

Language Art

Story or play based on survival problems.

Math

Determine the amount of land a family needed to be self-sufficient.

Science

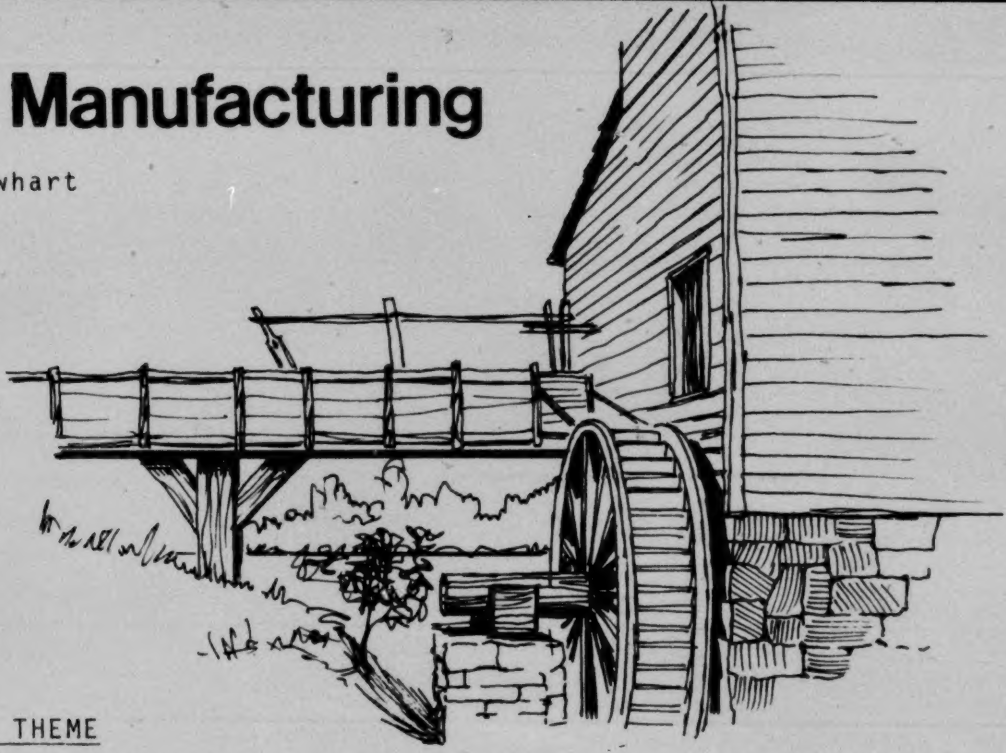
The raw materials needed for living and their properties. Advantages and disadvantages could be examined.

Nature

A succession study of the take over of the area after its desertion could easily be made.

Early Manufacturing

Gerald Newhart



CONCEPTUAL THEME

Early manufacturing in the Lehigh Valley.

OBJECTIVES

Upon completion of this activity, students will be able to:

1. Determine why the early manufacturing moved into the area.
2. Determine where the raw materials came from to entice the manufacturing into the area.
3. Determine why the manufacturing had to change over the years.
4. Determine why the manufacturing finally came to a halt in the early 1900's.

Equipment and Materials

Jacobsburg State Park Maps (one for each student)
*Slide Pictures
Chronology of Jacobsburg area (one for each student)

*Available from Colonial Northampton Intermediate IMS

PRE-ACTIVITIES

Study unit on life in Pennsylvania 1740-1830.

ACTIVITY PROCEDURES

1. Student response sheet enclosed.
2. Questions for discussion
   - A. Why did manufacturing move into this area?
   - B. What raw materials were available to help manufacturing at this time? Name three.
   - C. What changes in the types of manufacturing occurred over the years? Why?
   - D. Why did the manufacturing fall off and finally stop in the early 1900's?
3. Data
   - A. Have students check the sites.
   - B. Give out site data and maps.
   - C. Answer the discussion questions from information obtained at the site and the data sheets with maps.
4. At park site
   - A. At site 7 , look over the dam breast.
   - B. At site 9 , look for the walnut trees and the Mill Race.
   - C. At site 12 , look for the cement pile.
   - D. At site 17 , look over the operations of the slate quarry.
   - E. At site 19 , look at the outline of the barrel boring mill and the vats in the Tannery.

POST ACTIVITIES

Show the economic, cultural and social connections by this area with the surrounding Lehigh Valley areas for the period from 1740 to 1830.

OTHER CURRICULUM AREAS

Math

Figure out the amount of trees or per cent of a tree needed to make a gun stock. Give the approximate number of trees in the area and estimate how many guns could be made from Henry's Woods.

Art

Draw or construct a model of the old buildings in the area.

Science

Compare the methods of manufacturing of the 1800's with the methods used today.

Language Art

Have the students write a story about people who worked in the mills and how they felt toward their work.

History

Study of the life of Indians that lived in this area before the settlers moved in.

Nature

Investigate the changes in the terrain caused by the manufacturing in the area.

TEACHER REFERENCES

Henry J. Kauffman. The Pennsylvania-Kentucky Rifle. Stackpole Books, Harrisburg, Pa. 1960.

The Northampton County Historical and Genealogical Society. Northampton Heritage. Penns Valley Publishers, Inc. State College, Pa. 1953.

Joint Planning Commission of Lehigh-Northampton Counties. History of the Lehigh Valley Region. November, 1963.

Dr. Richmond E. Meyers. Lehigh Valley The Unsuspected. Northampton County Historical and Genealogical Society. Bethlehem, Pennsylvania; Lehigh Litho, Inc., 1972.

Archeology

Stephen Miller

There have been several very important and closely interrelated factors in the evolution of the human species. Of these, there are three which we can treat as basic:

1. Ecology - The physical and biological aspects of the environment.

2. Phenotype - Those observable anatomical and physiological characteristics of the species which are inherited.

3. Culture - The traditions of human toolmaking and tool use and of human languages and social organizations.

Culture is man's peculiar way of adapting to his environment. Whereas other animals grow claws, sharper teeth, or heavier coats of fur as adaptations, men construct new tools, new ways of making clothing, etc., when faced with similar conditions. Cultures in the past, while they must be thought of in this way, never explain themselves as completely representative even of the material culture of the people who left them.

There are several levels of inference which are available to the archeologist, depending on how much information he has. First, there is the single artifact - its size, shape and composition. With these facts, one might reach some tentative conclusions about the artifact's possible uses. There is also the site with its assemblage of artifacts. Here, the facts concern not only the artifacts, but their positions relative to one another and to the other components of the site and its surroundings.

With information like this, one can begin to speculate about occurrences. What went on at the site? How were people adapted to the environment at a particular time and place?

We begin by facing some problems of archeology. We shall attempt to introduce two kinds of thinking. One of these ways of thinking is to view culture as adaptation; the other is to view archeology as a study of "races of the past". It is possible to view archeology in this way because cultures are distinctive of men. We can usually recognize cultural remains as such and we can interpret them to some extent.

To establish these ideas, we will perform an exercise in archeology of the present. The teacher will be given a map of an abandoned Indian campsite along with some illustrations of the artifacts found there. Students will be asked to unearth these artifacts and interpret their find as an archeological problem and to reconstruct as much of the way of life of these "unknown" people as they can on the basis of the "archeological" evidence at hand.

Having provided the student with an introductory statement, ask for an informal definition of archeology. The point is that archeology is a technique by which anthropologists (students of man) attempt to gain information about one aspect of man, his prehistory. An archeologist is an anthropologist who specializes in human prehistory. Do not linger on precise definitions for these terms - just discuss them for a moment and go on. We want students to look for meaning and not to memorize pat phrases.

In order to avoid the problems of extensive digging, we have given them a "surface" site, one that requires only superficial excavation.

"What questions can we ask of the artifacts and other data discovered?" Have the students write their responses as they dig (or if time is short, handle it by discussion). Then have them evaluate the questions in terms of the likelihood that the available data will provide direct answers. For example, "How many people lived here?" is a question that may become answerable as the data is analyzed, but it requires some intermediate questions, such as:

How big is the site?
What do the "post molds" represent?
How many "hearths" were there?

"Where is the site?" is a question that cannot be answered from the data unless the student knows the area or makes inferences to what type of people probably lived here.

There are, at least, two categories of questions to be asked:

1. Questions about the people, ultimately the most important.

2. Questions about the data, the answers to which can then be applied in synthesizing answers to the first category of questions.

This is a good time for the students to consider things like the climate, the plants and animals, and the water supply.

One other question that may arise early (if not, it should be brought up now) is, "How old is the site?".

Possible discussion questions:

1. How many people lived here? Men? Women? Children?
2. Why did the people choose this particular spot?
3. How did these people make their living?
4. What other activities took place?
5. How long was the site occupied?
6. Was this a permanent site or did people move around?
7. What did they do with their leisure or did they have any?
8. How did they raise their children?
9. What was their religion like?
10. How were they organized? Did they have a chief?

Students and teacher should now prepare to sort out the questions which can be answered from those which cannot. The students (and the teacher) should be encouraged to discover additional significant questions whether they are answerable from the data or not.

Here are more general questions to be planted if and when time allows:

1. What relevance has prehistory for the study of history?
2. Are archeologists and "pre-historians" the same thing?
3. Are archeologists anthropologists, anthropologists archeologists, or what? Why?
4. What else do anthropologists do?
5. Do archeologists and historians have anything in common? Might they ever work together?

By now, we should have hoped to establish several points:

1. Archeology is a technique used by anthropologists to learn about prehistory.
2. Archeology is much like old-fashioned, mystery-story detective work.
3. It is important to know what questions to ask and when to ask them.

Careful examination of the site and discovered artifacts will elicit such information as time of year the site was first occupied, time of year it might have been abandoned, kind of animals eaten and, possibly, hunting and gathering methods employed.

Students should discuss the ways in which these people's culture could reasonably be different from the way it is. They should be encouraged to try to find whatever ecological bounds may exist. For example, seasonal availability of foods and water might prevent establishment of permanent residence and keep group size to a minimum. This discussion is important to further establishment of the view of cultures as adaptations.

Consider as many limiting factors to the way of life of a Northeastern Indian as time allows: kinds of meat available, kinds of plants, water supply, etc.

There are distinct limits to the kinds of things that can be learned from archeological evidence alone, since some remains may be entirely symbolic within the context of the culture examined. For example, the true function of such an artifact as the "Venus of Willendorf" can only be guessed.

Book List

Introduction to Archeology. Deetz, $1.25
Excellent Student Guide - could be used in class.
Beginner's Guide to Archeology, Lewis Brennan, $9.95
Time - Life - Early Man - Good pictorial display of primitive tools. Excellent for class use.

Unearthing an Indian Village

CONCEPTUAL THEME

An exercise in Archeology

OBJECTIVES

Upon completion of this activity, students will be able to:

1. Appreciate how archeologists and anthropologists solve problems as they occur during excavation of a historical site.
2. Develop answers to questions about artifacts found during an excavation.
3. Learn the value of culture in a society.
4. Understand the importance of tools to a culture and how tool detail indicates the sophistication of a society.
5. Become aware of various occupations related to an archeological excavation.
6. Realize that cultures are man's adaptation to his environment and how the environment becomes a limiting factor in determining and controlling cultural characteristics.
7. See the limitations of archeological interpretation of artifacts which have, or may have, symbolic meaning.

Equipment and Materials

Hand trowels
Small stiff brushes
Sketch and note pads
Pencils

ACTIVITY PROCEDURES

The purpose of this activity is to allow the student to get his hands on an activity that will enable him to climb inside an archeologist's skin for a little while.

Don't be overly concerned if your students aren't asking all the right questions at the correct times. There is time for that in the follow-up activities.

About the Artifact - Can be used in the field and/or in the classroom.

When the first tool is found, call a group of students around and have them examine it closely. Students may well ask, "How do you know it is not a natural object?" Let them discuss it; then challenge them to find something else like it around them.

Next, raise this question: "Given this object, with no additional information except that it is fairly old, what questions can we ask about it?" This will bring a variety of responses ranging from, "What color is it?" to "Who made it?"

Tell the students that all questions must have some bearing on the object itself; e.g. "Who made it?" is valid, but "Did the man who made it ride a horse?" is not. Keep the focus on the way the questions are stated and ask for a restatement to produce more inclusive answers.

An example of restating would be:

S: "Was it used for bashing heads?"
T: "What does someone else think?"
S_2: "I think it was used for cutting brush."
T: "Does that answer S's question?"
S_2: "No. A better question would be, 'What was it used for?'"

Conclude the exercise by pointing out that the reason for getting so involved in categorizing questions is to understand, in part, why anthropologists make so few unqualified interpretations - some answers must forever be prefixed with "perhaps".

After you gather everyone around the first few "finds", let the students analyze on their own a bit more freely. It might be suggested here that each artifact dug up, be placed near the spot of discovery. This will allow everyone to get a perspective when they've finished.

It will be helpful to have an artistic student or two make a record of sketches for each different artifact found. This will come in handy when you return to class. The name of the person who made the discovery might be printed on the sketch and placed on the wall of your classroom.

Don't forget to take a camera! Slides and pictures of an activity of this kind are of great value.

The Teacher Reference Map in this module has a detailed description depicting the placement of the artifacts. This will help you locate all the artifacts and also give you a chance to plan your discussion before their discovery. There is a student map included with this activity to be used as follow-up material.

You might want to give students clues since a few items at the site are not easily discernable. An example is the "post molds". They are places where rotting remains of wood or a difference in the soil texture tells the archeologist that a piece of wood was once there.

Information about the "tamped areas" should be withheld until you return to class. The tamped areas were used for recreation (children's games, etc.) and curing meat. The village will begin to take on a sharper perspective when the "post molds", tamped areas and location of other artifacts are shown together on the ditto sheets given to students in class later.

The artifacts your students will dig were constructed by Seventh Grade students at Shull Jr. High with assistance from the Easton Area School District's Art Director, Mr. Joe D'Amelio. Clay was used to fashion tools and other cultural implements. The skulls canbe molded from plastic Halloween figures purchased at Woolworths. You might think about having some of your students construct artifacts and bury them for other classes to unearth in a 10' x 10' site near your school.

The following material is included with this module that might come in handy when you return to class:

1. Master of Map - To be given to students after they have unearthed the site. This should generate further discussion about what went on in the woods and give you a chance to nail down some points you want to stress.

2. Observation and Analysis

   A. "Why are so many on an Archeological Dig?" Students are required to read about various occupations involved in the examination of an archeological dig and answer questions about the pictures displayed.

   B. "Painting Pictures of the Past" Pictures are drawn on the basis of what archeologists have found.

3. Large sketches of tools much like those your students unearthed. They are detailed enough to have several questions pop forth about them.

4. A sample of the Venus to take along with you. Is she a "tool"? If so, what kind? What was she used for? (Suddenly we are using the word "she" instead of "it"!) Why doesn't she have face or feet? Are we looking at one of the first known psychological tools?

   Probable uses for the "Venus of Willendorf" included that of a fertility idol. However, this is merely a speculation.

   Additional activity - An interesting related student project is to make a rock hand tool (scraper, axe, arrowhead or other point). Soft shales can be used for learners to discover the different ways that rocks can be shaped into tools.

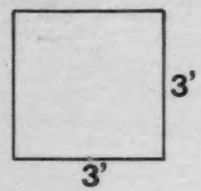
KEY

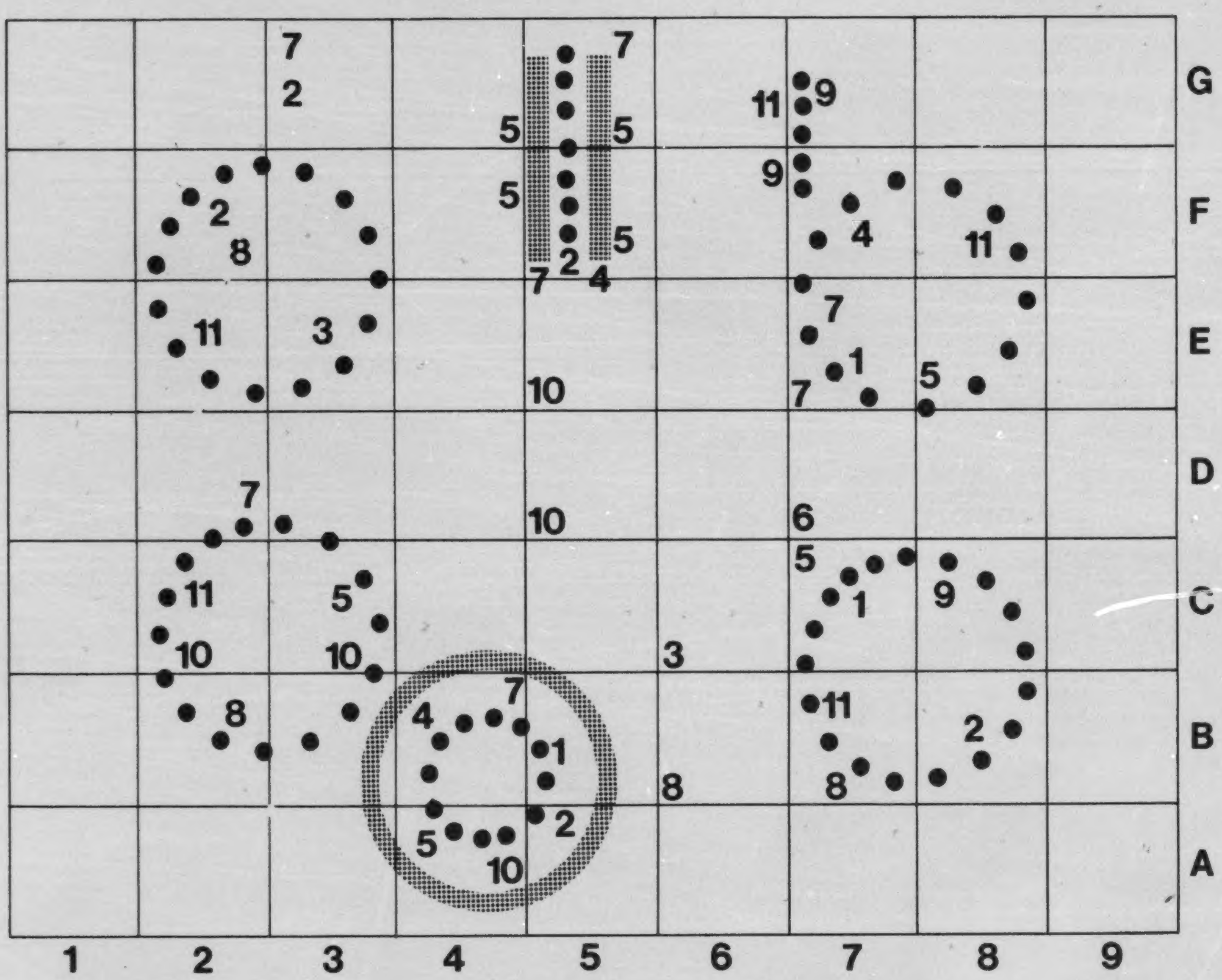
● Post molds

▨ Tamped Area

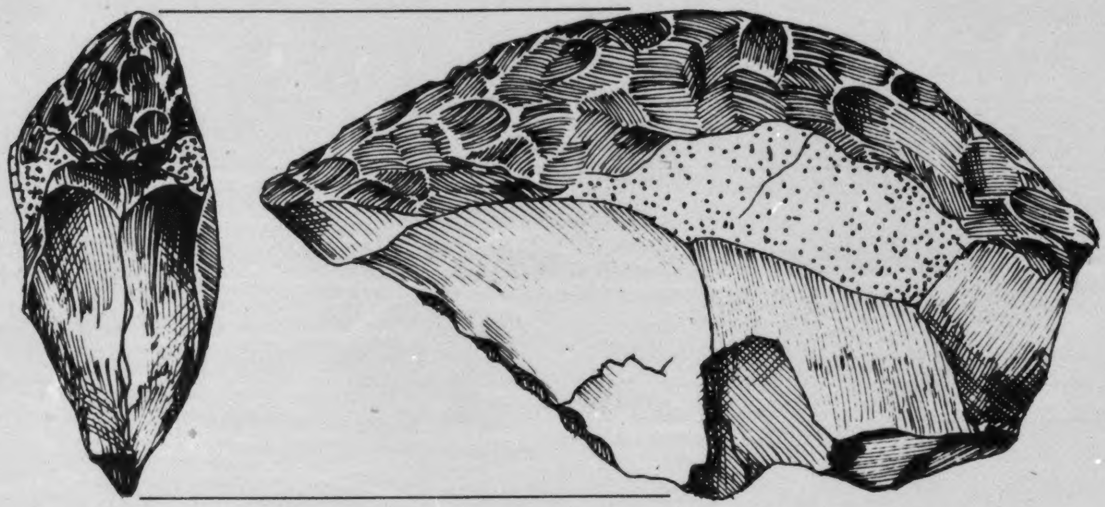
1. Venus
2. hand axe
3. projectile point
4. pebble stone
5. scraper
6. turtle shell
7. deer bones
8. human skull
9. jewelry
10. bowls
11. tablet

SCALE



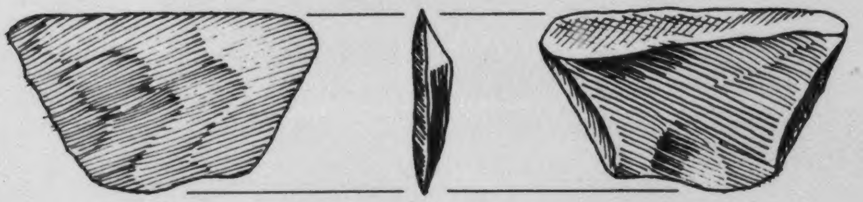


MASTER MAP for Indian Village



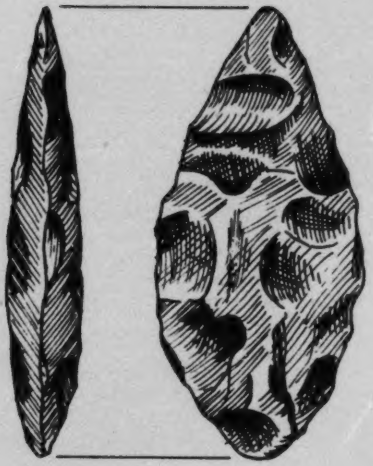
Tool type: Side Scraper (flake)

The flaking on this tool is similar to the projectile point. Does the name indicate a function with which you agree? What might have been scraped with this tool?



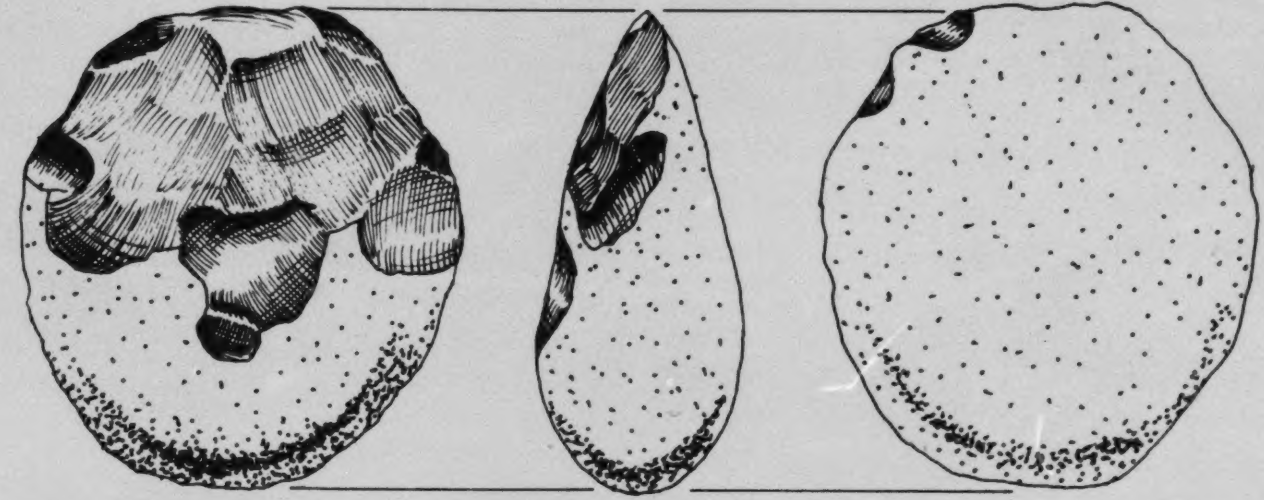
Tool type: Projectile Point (blade)

Could this tool serve several functions?



Tool type: Microlith Arrowhead

This is but one of many small tools that are fragments of blades. What advantages could the maker of such a small tool have had? Why do you think archeologists can call this an arrowhead rather than a projectile point?



Tool type: Pebble Tool

This tool is made from a river pebble and is shaped only at one end. How might this tool be used?

Physical Fitness Trail

James Lindenmuth
Grades - All

CONCEPTUAL THEME

The rationale of education is to provide for the optimum physical, social, emotional and intellectual growth and development of children in light of their needs and interests regardless of any limitations they possess.

Physical education contributes to this through its objectives and by means of its activities. Variation and modification are two key approaches to overcoming any limitations.

OBJECTIVES

1. To give attention to the characteristics and needs of children as they relate to their environment through physical education.
2. To suggest activities found in a basic physical education program that can be adapted to environmental education.
3. To provide an appealing approach - especially for the classroom teacher who is not a physical education specialist.
4. To provide methods and techniques of integrating physical education with other subjects such as social studies, language arts, art, mathematics and science.

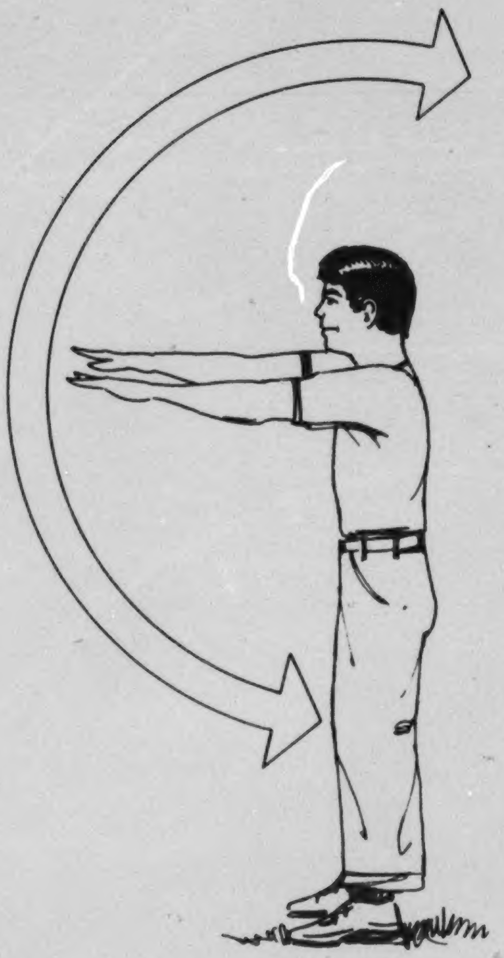
Activity #1 - Fitness Trail Hiking

An invigorating activity, hiking, is gaining popularity among all ages. In fact, the Outdoor Recreation Resources Commission reports that by the year 2,000, hiking will increase an 11% over its 1960 rate.

Equipment - Pair of good hiking boots

Course - Can be followed by people at their own pace, whether a walk, jog or run - depending on their individual needs. It is ideal for cardiovascular and muscle tone development and fitness.

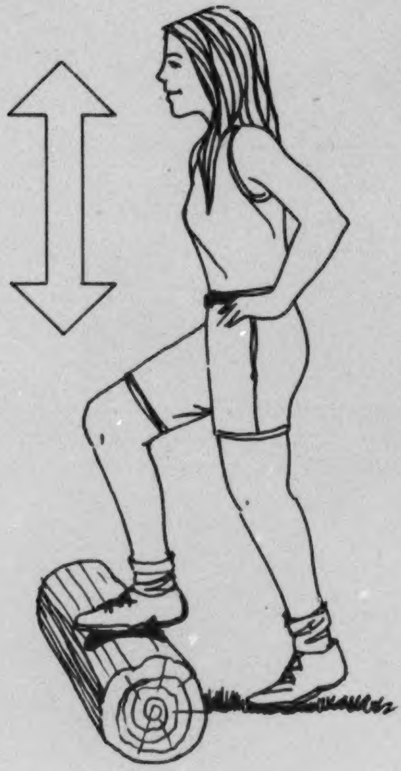
This activity can be conducted on the Physical Education Loop in the Natural Area of Jacobsburg State Park or any similar location at your school site. The loop at Jacobsburg begins at the foot of the noll on the north edge of Site 2 and comes out on the main trail near Site 4.



Stop 1

Swing arms in circle forwards and backwards.

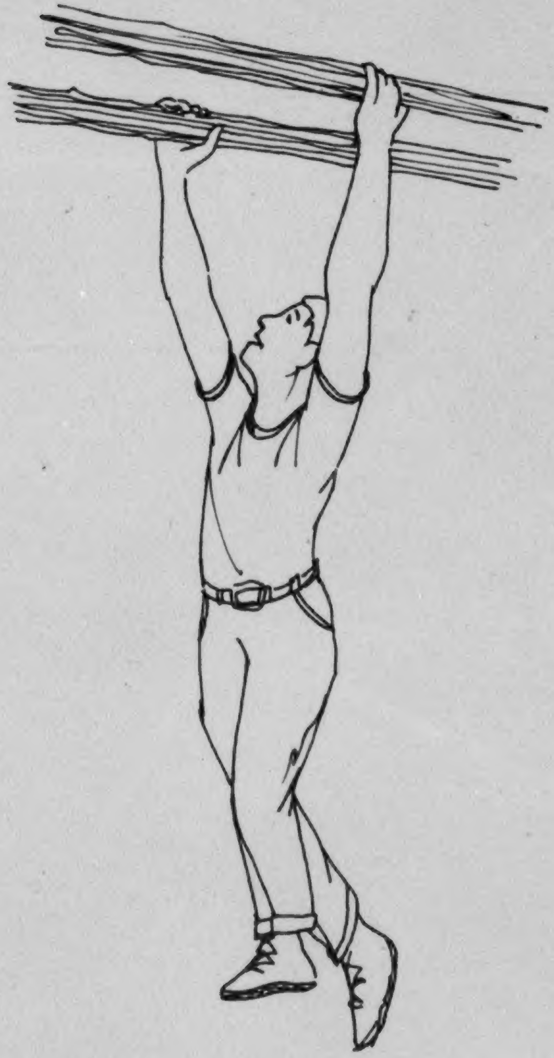
Family	Athlete
10 times	10 times



Stop 2

Step up on log with right leg, then down. Step up on log with left leg, then down.

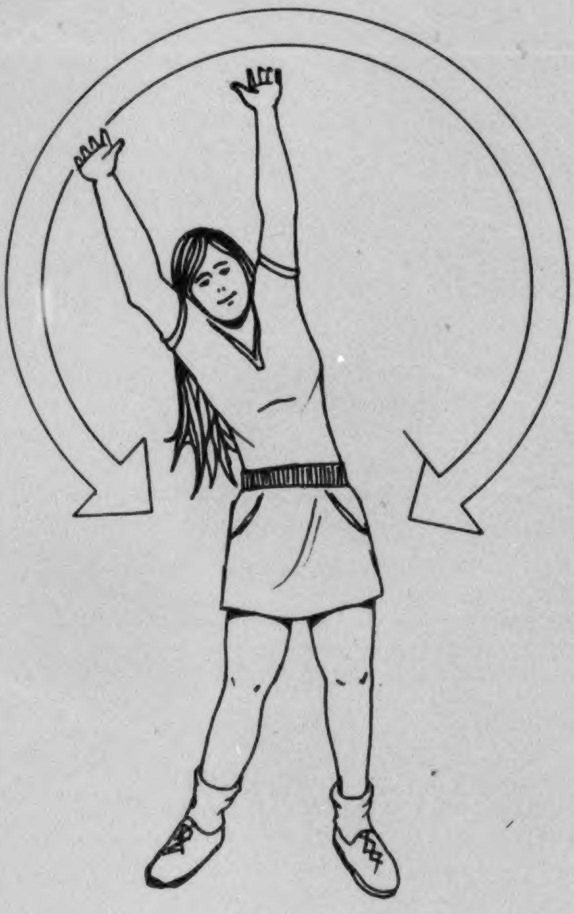
Family	Athlete
5 times	5 times



Stop 3

Travel along logs. Hand over hand.

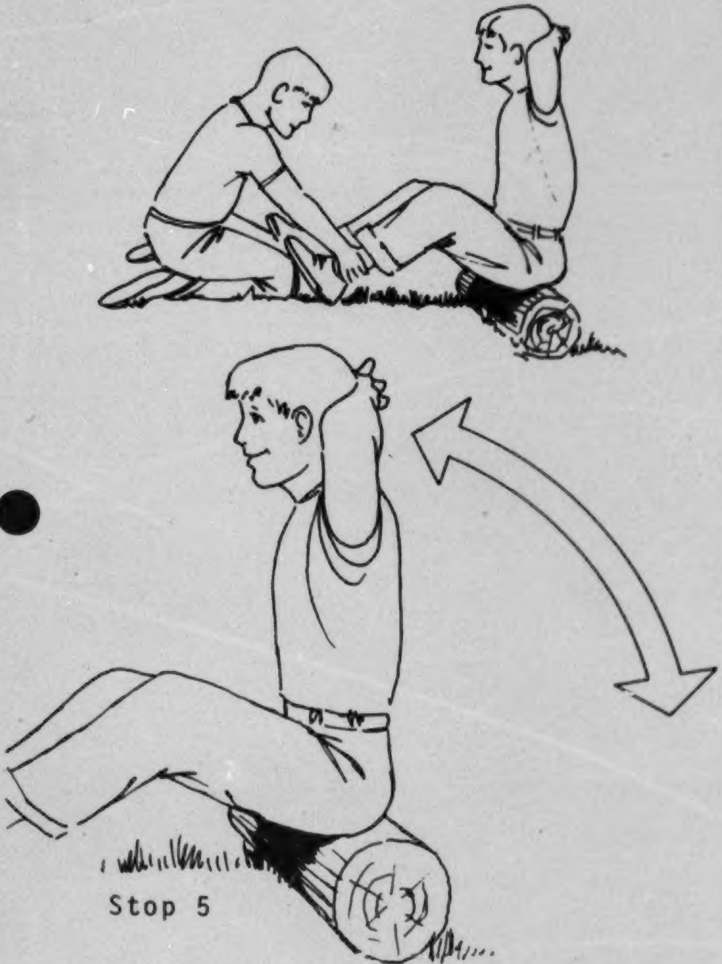
Family	Athlete
1 time	3 times



Stop 4

Swing arms in a circle from the hip. Twice to right. Twice to left.

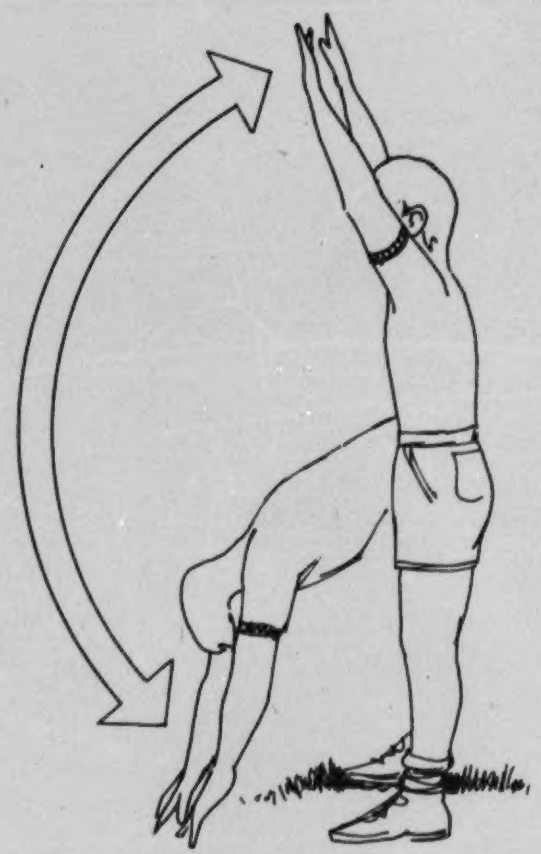
Family	Athlete
10 times	10 times



Stop 5

In sitting position with toes anchored, lean backwards, (down), then forward (up).

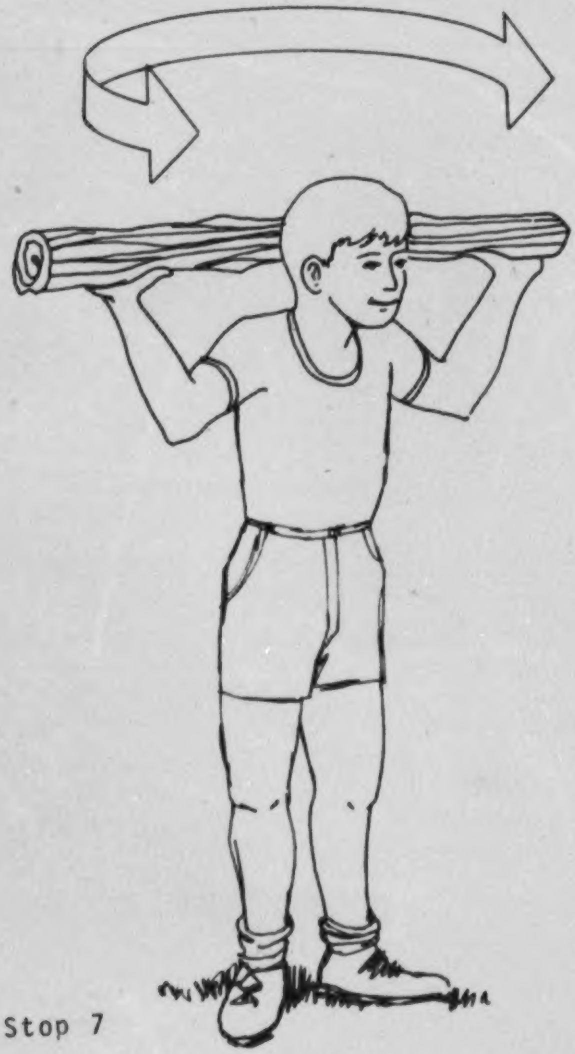
Family	Athlete
5 times	10 times



Stop 6

With arms outstretched, bend and stretch upwards.

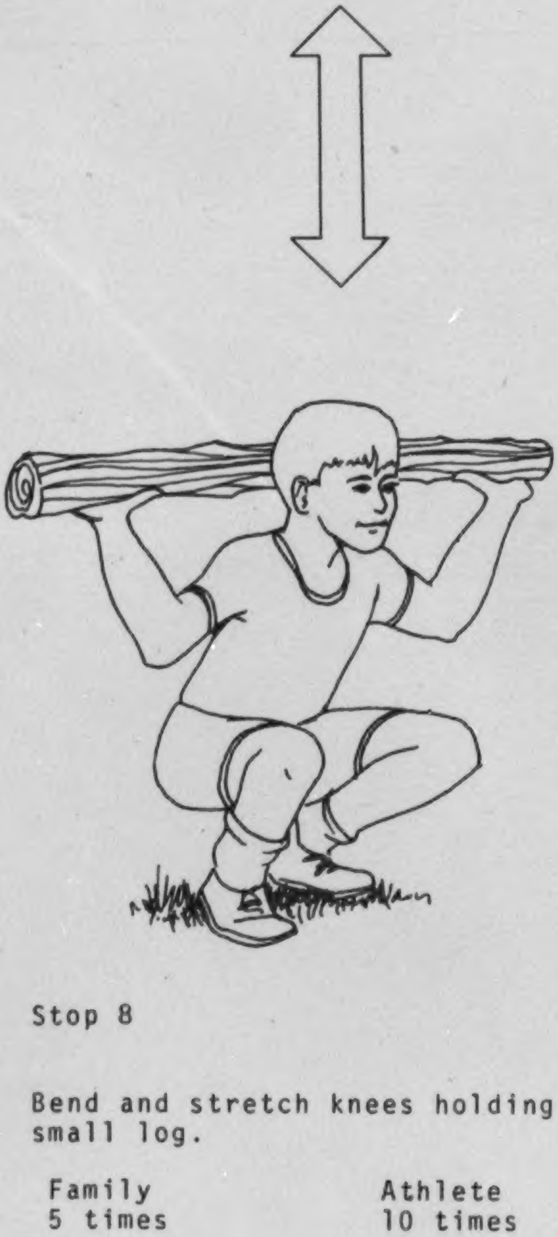
Family	Athlete
10 times	10 times



Stop 7

Swing trunk from left to right.

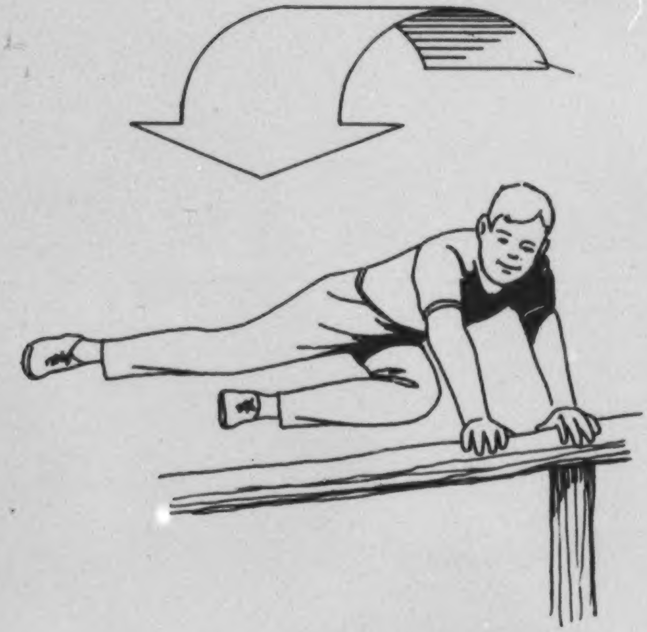
Family	Athlete
5 times	10 times



Stop 8

Bend and stretch knees holding small log.

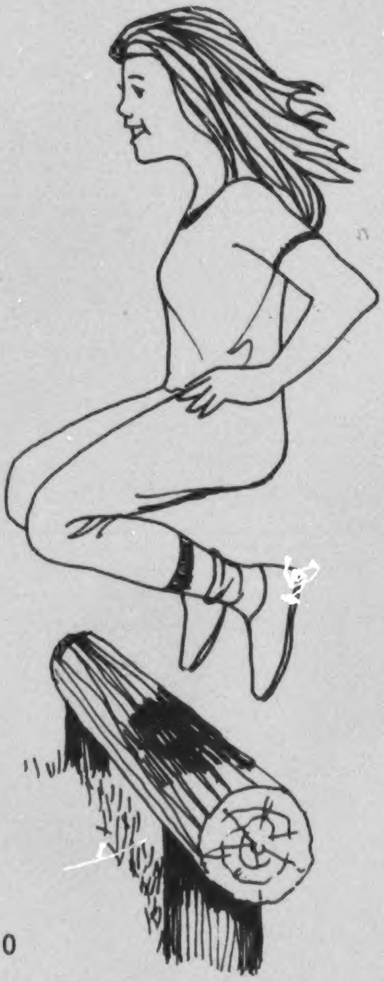
Family	Athlete
5 times	10 times



Stop 9

Spring over log, legs outstretched. Return to starting position.

Family	Athlete
4 times	8 times



Stop 10

Frog jumping over log hurdles.

Family	Athlete
1 time	1 time

Game play must be kept snappy and vigorous. A good leader stops a game before it goes dead. The weather, disposition of the group and the leader, the nature of the game itself - all contribute to the variances employed in the length and success of the game. Much can be done for the game by the attitude and enthusiasm of the leader and the one teaching the game.

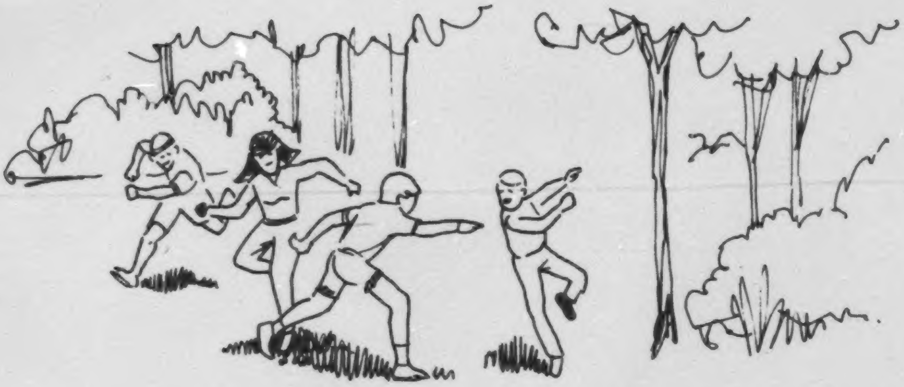
The games in this report have been selected for the ability of certain age groups.

Introducing the Game

To introduce the game, call the group to order. Name the game and arrange the players into formation. Demand strict attention when a new game is introduced and then explain it quickly and briefly - along with important rules to follow. Rules must be enforced. Decisions must be fair. The game should be modified if it is too strenuous. Allow children to rest if they appear tired. Always select new leaders for each new game. No equipment should be given out until all directions have been given to the group. Everyone should participate in some way.

"BULLFROG RACE"

Area - Forest
Age Group - 1-5
Equipment - None
Number of Players - Any number
Formation - 2 lines of equal number
Rules - Players place hands on hips and squat with feet together in a given line. At signal, player hops to designated goal line. This may be done on an individual race or as a relay.



"HUNTER AND ANIMAL"

Type - Running Tag

Formation

Single circle all holding hands. One child, the "animal", stands inside the circle, and one child, the "hunter", stands outside the circle. The hunter calls to the animal, "Who let you in my forest?" The animal answers, "No one". The hunter then chases the animal and must follow the same route the animal runs, in and out and around the circle. When the animal is tagged, a new animal and hunter are chosen and the game continues.

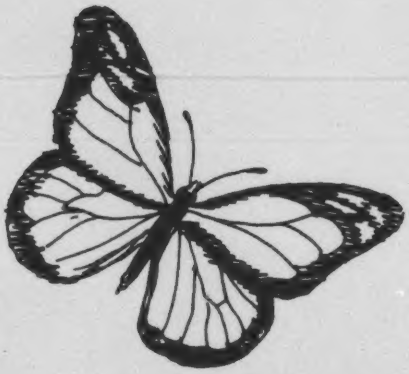
Variation

1. Area of forest used instead of circle formation found on playground or classroom.
2. A circle formation used with a definite area of forest. Child that plays "animal" uses cricket noisemaker. Hunter has to use sound of noisemaker to locate animal - ideal for visually handicapped or blind students.

Related Physical Education Activities

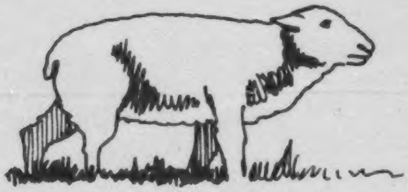
1. Plant imitations
    - A. Trees
    - B. Flowers
2. Animal imitations
    - A. Bear
    - B. Deer
    - C. Frog
    - D. Bird (calls)
    - E. Man
    - F. Lion

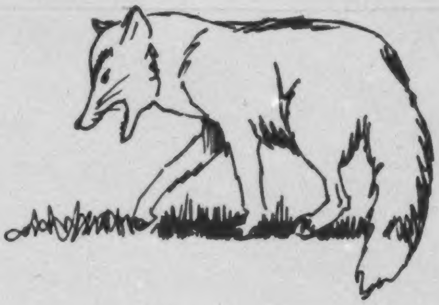
All imitations can be taught as physical education stunts.



"BUTTERFLIES"

Area - Definite area of forest
Age Group - K-2
Equipment - None
Number of Players - 10 to 40
Formation - Random
Rules - One child is the butterfly catcher and stands in front of other players. Another person is selected to be first butterfly and he runs around area waving his arms up and down. During his run, he taps other players on the head and they become butterflies. When there are about eight butterflies, the butterfly catcher taps on the tree and the butterflies must fly home before they are caught. First player caught is "it" for the next game.



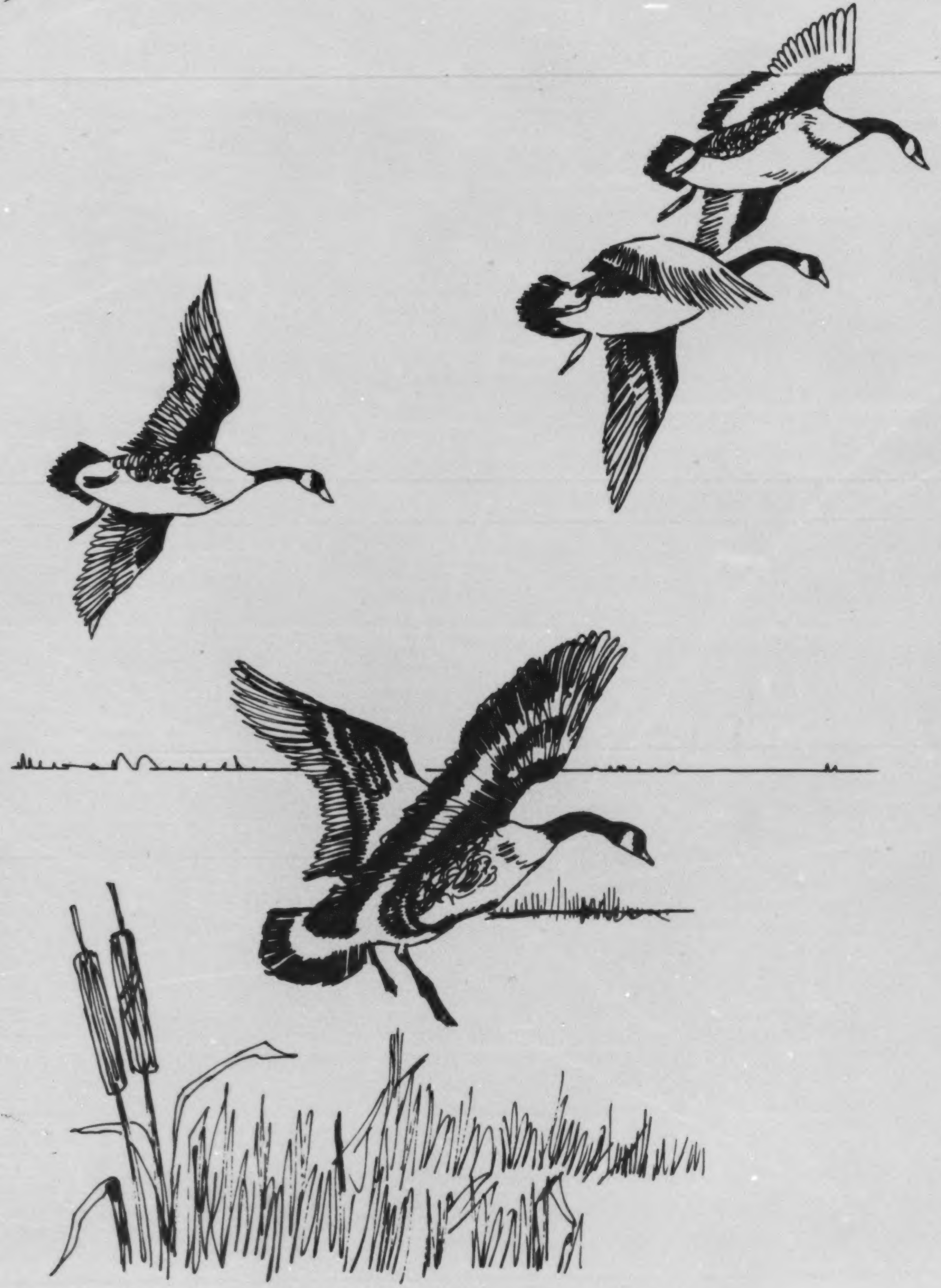


"FOX AND SHEEP"

Area - Definite area of forest
Age Group - 3-6
Equipment - None
Number of Players - Any number
Formation - Random
Rules - One player is fox. All others are sheep. The fox has a den in one area and sheep have a fold at the opposite end. The fox leaves his den and the sheep come to meet him. One sheep says, "What time is it?" If the fox answers, "One o"clock" etc., the sheep are safe. Should the fox answer, "Midnight", the sheep must run for their fold, the fox chasing them. All sheep caught now become foxes and must catch the remaining sheep.

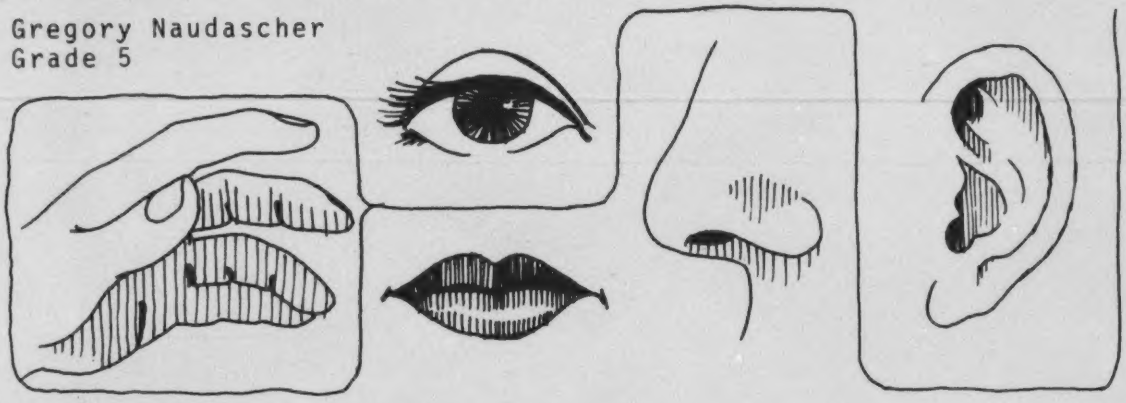
Related Classroom Activities

Art	Draw, sketch, paint pictures of area vegetation or animals found in forest. Make a clay model of forest area including streams, rocks, trees, fences, etc.
Language Arts	Write stories about forest animals, plants, flowers. Make a vocabulary list of forest words. Make signs of the clay model of forest, etc.
Music	Sing songs which dwell on the theme of the forest or woods, plants or animals.
Social Studies	Plan a visit to a nearby woods, forest, state park, etc., and experience it first hand.
Science	Use forest to present nature study science of how things grow, change, etc., the effects of weather, value of animals and plants, study the soil, water, light, air, etc.
Math	Aid number concepts, measure geometric forms found in forest, addition and subtraction of components found in forest.



Nature – Awareness

Gregory Naudascher
Grade 5



CONCEPTUAL THEME

Awareness of one's natural surroundings.

OBJECTIVES

Upon completion of this activity, students will be able to:

1. Exhibit an awareness of the fact that their world is what they hear, smell, touch, see and taste.
2. Show evidence that they can clearly define the five senses and demonstrate their functions within their environment.
3. Use as many of these senses as are appropriate in exploring the environment around them.

Equipment and Materials

An old clean sock
Sample items; marble, pencil, small block, large nut

PRE-ACTIVITIES

Activity 1 - Using the senses to discover shapes and textures.

Put four or five items with different shapes and textures into an old sock (sample items: a marble, pencil, small block, large nut). Pass the sock around, and let each child try to identify the items in the sock.

Ask the questions:

1. What kind of shapes did you find in the sock?
2. How did you learn what was in the sock?
3. What other kinds of things might you learn by using your sense of touch?

Activity 2 - Learning with the ears, nose, hands, and eyes.

Let the children explore their classroom and ask them to be ready to tell the rest of the class about something that each of them found. They should make an effort to describe their findings in terms of the senses. This may take place over a period of several days, until each child has had an opportunity to describe his object and share a drawing of it.

Activity 3 - Sharing information.

Have the children describe something that they found in the activity above and tell how it looked, smelled and felt. They should not reveal the objects' identity to the other children. It may be fun for the rest of the children to try to guess what is being described.

OUTDOOR ACTIVITY

Field trip to park site. Take the children on a short exploratory walk (20-30 minutes) around one or more of the learning sites in the park. Encourage them to explore with all of their senses and try to find, at least, one thing that is particularly good for each sense. They should make brief notes to take back to the classroom or park site where follow-up discussion will be held.

POST ACTIVITY

As soon as the children return to the classroom or site for follow-up discussion, have them fill out Worksheet A-1, or ask them how they might share the things they discovered with each other and with anyone else who might come into the classroom.

EXTENSION

The child may be asked to place himself in the role of one of the sensory organs and describe a typical day and its happenings. This could be handled as a creative writing lesson.

Nature—Effects of Light

Donald Sysko
Grade 6

CONCEPTUAL THEME

Competition among living things exists wherever insufficient amounts of any life requirements are available to supply the demands of all living things present.

OBJECTIVES

Upon completion of this activity, students will be able to understand:

1. That all plants need favorable conditions to grow.
2. That most plants grow toward the sunlight.
3. That a forest is a community of plants and animals.
4. That life on the forest floor is abundant and varied.
5. That some plants cannot manufacture their own food and must live off other plants.

Equipment and Materials

4-1/2 pt. milk cartons
50 Seeds
Soil

The following films are available from the Intermediate Unit 20:

"How Plants Help Us"
"What Plants Need For Their Growth"
"Plant Survival"
"Parasites"

PRE-ACTIVITIES

Before the lesson is to be presented, begin several projects in the room.

Using the milk cartons, seeds, and soil, perform the following experiment.

Using an equal amount of soil in each container, arrange the seeds in the following order:

One box with 5 seeds and place in the sunlight.
One box with 5 seeds and place in the dark.
One box with 20 seeds and place in the sunlight.
One box with 20 seeds and place in the dark.

After ten days and equal attention to each container, ask the students the following questions:

1. What differences are observed in the four containers? Why?
2. What energy influenced the growth?
3. How can this experiment be compared to forest growth?

ACTIVITY PROCEDURES

Take the class to any of the sites and after taking time to observe the environment, ask the following questions:

1. What plant life grows the greatest distance apart?
2. What plant receives the most sunlight?
3. Where do you find moss?
4. Which plants use the most water?
5. Can you find any parasites?
6. Could many trees of a 12" diameter grow in a given area? Why or why not?
7. Why are some crops such as grass and grains planted very close together?
8. What would happen if other crops or trees were planted very close together?
9. Why do some plants die in an overcrowded area?

POST ACTIVITIES

Have students look for ways in which plants have become adapted to the environment.

Have Soil Conservationist speak on soil management.

OTHER CURRICULUM AREAS

Art

Draw plants which grow in and out of sunlight.

Science

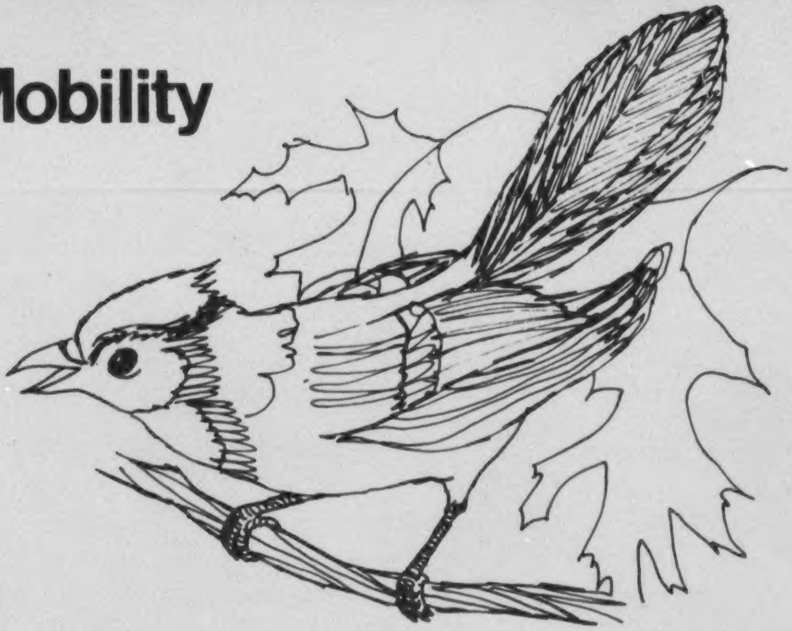
Experiment planting seeds in different types of soil.

Math

Determine distance between plants and/or trees.

Nature—Mobility

Donald Sysko
Grade 6



CONCEPTUAL THEME

Living things are adapted to perform certain duties which relate to the balance in nature.

OBJECTIVES

Upon completion of this activity, students will be able to:

1. Understand that birds are valuable both aesthetically and economically.
2. Identify certain birds by sight.
3. Identify certain birds by sound.

Equipment and Materials

Pictures of birds
Records of bird calls

The following films are available from the Intermediate Unit 20:

"Birds - How We Identify Them"
"Birds of America"
"Yours For A Song"

PRE-ACTIVITIES

1. Use large pictures of birds to show the difference in size, color, beaks, and feet.
2. Listen to records of bird calls.
3. Discuss diets of birds.
4. Discuss habitat of birds.
5. View films.

ACTIVITY PROCEDURES

Observations may be made at any of the sites. Stress the importance of quiet.

1. What birds can you identify by sound?
2. What birds can you identify by sight?
3. If they were feeding, what were they eating?
4. Would they have to supplement their diet during different seasons?
5. How did the birds differ when you moved to another site?
6. Did their diet differ?
7. Was there any noted physical differences in the birds?
8. Could you identify any of their homes?

POST ACTIVITIES

Compare the birds found in the woods with the birds around the school.

Could the birds around the school live in the woods?

Discuss birds found around the homes of the students.

Make a bulletin board of birds in the area.

OTHER CURRICULUM AREAS

Art

Draw pictures of birds.

Math

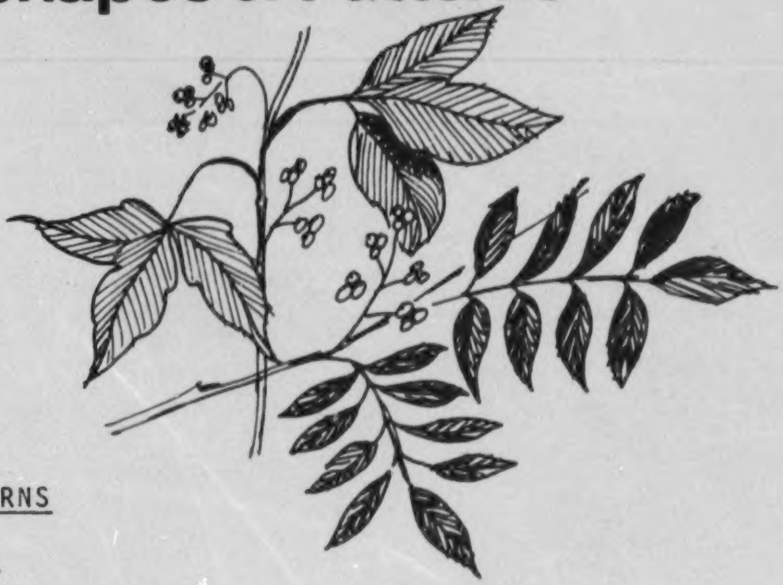
Find out which birds migrate and figure the distance they travel.

Language Arts

Write a creative story about the conversation between two birds.

Nature–Shapes & Patterns

Donald Sysko
Grade 6



SHAPES AND PATTERNS

CONCEPTUAL THEME

Man and animal must be aware of plants which may be harmful to them.

OBJECTIVES

Upon completion of this activity, students will be able to:

1. Realize that some plant life is potentially dangerous.
2. Identify the plants which are harmful.

Equipment and Materials

Poisonous plant charts

PRE-ACTIVITIES

1. Show pictures of poison ivy, poison oak, poison sumac, and Virginia Creeper.
2. Discuss characteristics of poisonous plants.
3. Discuss reasons to avoid these plants.
4. Emphasize not to touch any plants - only observe.
5. Emphasize that pupils allergic to these poisonous plants should not accompany the class on the trip. These pupils may do reports on these plants in the school library.

ACTIVITY PROCEDURES

These questions may be asked at any of the sites or around the school grounds.

1. How can you always identify poison oak or ivy?
2. Which grow as shrubs? Which as flowers?
3. What characteristics do poisonous plants have which help cattle and other animals recognize their toxic nature?
4. What parts of the plant might be poisonous?
5. How is it possible for the plant to produce a poison that is harmless to the plant, yet harmful to animals?
6. How can a plant affect animals, including man, in harmful ways?
7. What are symptoms of plant poisoning or allergies?

POST ACTIVITIES

Discuss ways of eliminating poisonous plants.

Discuss possible home remedies for poison.

Make a bulletin board illustrating poisonous plants and list possible symptoms.

OTHER CURRICULUM AREAS

Art

Draw pictures of poisonous plants.

Language Arts

Research papers by people allergic to plants and any other interested people.

Nature—Home in the Woods

Donald Sysko
Grade 6

CONCEPTUAL THEME

Each species has tolerance levels for other factors and will be found only where these levels are not exceeded.

OBJECTIVES

Upon completion of the activity, students will be able to realize that:

1. The availability of water, nutrients, temperature, and other limiting factors help determine where each species will be found.
2. Every species has its own minimum requirements.
3. A forest is a community of plants and animals.

Equipment and Materials

Chart of animal tracks
Circular #151 from Penn State University

The following films are available from the Intermediate Unit 20:

"Animal Habitats"
"Animal Tracks and Sounds"
"Animals and Their Homes"

PRE-ACTIVITIES

1. Study chart of animal tracks.
2. Discuss homes of insects, fish and animals.
3. Discuss possible sounds of animals.

ACTIVITY PROCEDURES

These activities may be used at any site.

1. Do you hear any animals making a sound?
2. Can you find any traces of animals? Look for tracks, droppings, nests, bits of hair, bones or burrows.
3. Do all animals spend their lives in one home?
4. How does nature help animals detect danger?
5. Do some animals search for food more than others?
6. What effect does climate have on the food supply?
7. What do you think is the biggest animal living here? the smallest?
8. Do you think the animals live here all their lives?
9. Do you think the same animals are living here now that lived here 1,000 years ago? 100 years ago? 10 years ago?

POST ACTIVITIES

Of the animals you have seen or have found evidence of in the woods, choose one and try to discover all you can about it.

Make a bulletin board using the information from your findings in the woods. Show the animal, its food, and its home.

OTHER CURRICULUM AREAS

Art

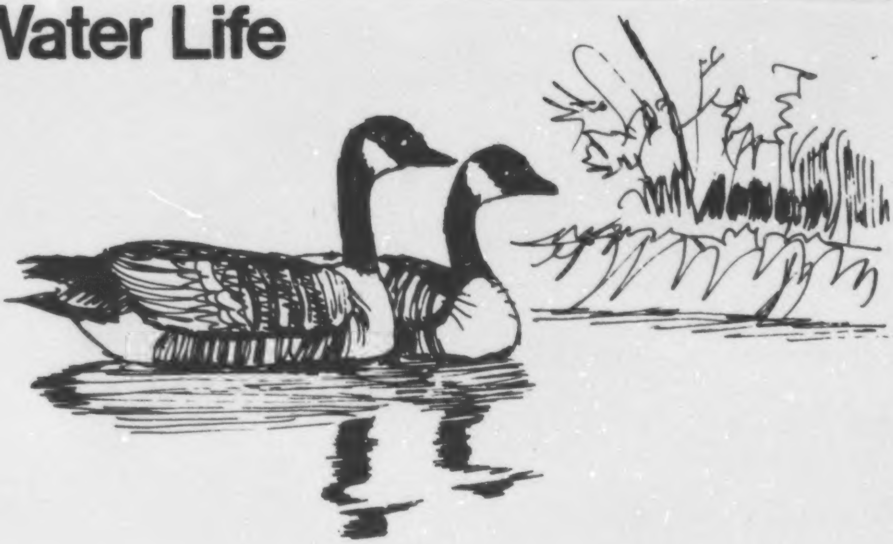
Make plaster molds of tracks.

Language Arts

Write a story about what the area was like 100 years ago.

Nature-Water Life

Donald Sysko
Grade 6



CONCEPTUAL THEME

Man needs water for life - and so does every living thing.

OBJECTIVE

Upon completion of this activity, students will be able to understand that for both plants and animals, water is the essential medium in which basic life processes - reproduction, respiration, food manufacture and digestion, growth, and excretion take place.

Equipment and Materials

The following films are available from the Intermediate Unit 20.

"Let's Take A Walk"
"Along The Brook"
"Life Along The Waterways"
"Spring Comes To A Pond"

PRE-ACTIVITIES

1. Discuss and demonstrate ways of properly removing specimens from the water.
2. Discuss food chains.
3. Discuss possible finds in the water.
4. Discuss water pollution.

ACTIVITY PROCEDURES

These activities will take place at Site 6.

1. What kinds of plants and animals live in the water?
2. What part of the water does each animal use as its home?
3. Do you think there are other animals in or near the water which you cannot easily see?
4. Do you find different plants and animals in different depths of the water?
5. Do some of the plants and animals depend on one another?
6. Do the animals have any effect on the water?
7. Do any birds seem to be getting any food from the water?
8. Are any animals feeding directly on the plants?
9. Are any insects being consumed?

POST ACTIVITIES

Make a food chain bulletin board.

Investigate food chains in and around the school.

Discuss why certain finds were in the water.

Discuss why the water was in the condition you found it. Was it polluted?

OTHER CURRICULUM AREAS

Art

Draw pictures of plants and animals which were found.

Language Arts

Write a poem about the pond.

Nature - Biotic & Abiotic Factors

Robert Burak
Grade 7

CONCEPTUAL THEME

Many factors both biotic and abiotic interact to determine the habitat of an organism.

OBJECTIVES

Upon completion of this activity, students will be able to:

1. Identify the general biotic and abiotic factors of three different natural areas.
2. Demonstrate a fundamental understanding of succession as related to habitat modification and evolution.
3. Demonstrate the use of senses in relating color, form, texture, sound and odor in the description of biotic and abiotic factors.
4. Observe how biotic and abiotic factors interact to produce habitat diversity.
5. Observe how biotic modifications have affected mobility.
6. Show the relevance of man in affecting changes in the environment.

Equipment and Materials

Lap Boards (one per student)
Plant and animal identification keys
* Pens or pencils

PRE-ACTIVITIES

Familiarize students with the following concepts and vocabulary.

1. A habitat is a complex interaction of biotic and abiotic factors.
2. Various combinations of biotic and abiotic factors cause habitat diversity.

3. All senses should be used in identifying biotic and abiotic factors of a habitat.

4. Succession is a continuous form of habitat modification.

5. Plants and animals have adapted physical characteristics which allow them to be better suited to the environment.

6. Man is the only organism which has the ability to drastically change the environment.

7. All habitats must supply the basic life requirements.

8. All habitats contain simple or complex food chains.

9. All habitats contain simple or complex energy chains.

Vocabulary

1. Environment
2. Habitat
3. Biotic factors
4. Abiotic factors
5. Senses
6. Texture
7. Succession
8. Adaptation
9. Producer
10. Consumer
11. Decomposer

ACTIVITY PROCEDURES

Recommended for use in this comparative study of habitats are the following nature sites:

Pool Area
Orchard - field area
Creek - forest area

The following activities may be conducted and questions discussed at each site.

Have the children close their eyes. What sounds do you hear? What odors do you smell?

Have the children touch objects in the immediate area. What textures do you feel?

Discuss the following questions.

1. What animals would you expect to find here?

2. What do these animals need to survive?

3. What plants would you expect here?

4. What do these plants need to survive?

5. What are the physical features of the area?

6. Can they affect the types of plant and animal life present now?

Divide the class into small groups. Have them explore the area for about half an hour, observing and recording the plant life, animal life, and physical features of the area.

1. How are the plants and animals suited for this habitat?

2. What is adaptation? How is it shown?

3. What is succession? How is it shown?

4. Have you noticed any evidence of changes occurring or having occurred in this area?

5. Is man responsible for any of these changes?

6. How could man help this habitat by change?

7. What effects does man have on the environment?

Find a rotten stump or log.

1. What things about this stump give us clues of past events that have taken place?

2. What factors caused these things to happen?

Have the students list the living things of the habitat and their effect on the stump and the non-living factors and their effect on the stump.

1. What is a food chain?

2. What is an energy chain?

3. What is a producer?

4. What is a consumer?

5. What is a decomposer?

6. What would happen if one of the links in the food or energy chains was broken?

POST ACTIVITIES

1. Compare and contrast the differences and similarities of each site.
2. Construct a food and energy chain for each site.

EXTENSIONS

1. Explore through audio-visual media habitats which are vastly different and/or strikingly similar to those explored.
2. Investigate and discuss the topic of endangered species.

OTHER CURRICULUM AREAS

Art

Photograph and/or draw specific areas within each site.

Math

Take a population count or survey at each site.

Language Art

Research reports, compositions, poems or panel discussions on "Man's Effects on Natural Habitats".

Nature -Appreciation

John Gabriel
Grade 8

GENERAL OBJECTIVES

To aid the children in their developing an awareness and appreciation of their natural environment and our relationship to this environment by means of observing and experiencing the natural processes as they occur.

Shapes and Patterns

CONCEPTUAL THEME

The pattern present in nature can be seen in the regular structure of leaves.

OBJECTIVE

Upon completion of these activities, students will be able to understand the presence of patterns in the shapes of leaves.

Equipment and Materials

- Drawing paper, drawing pencils, etc., pictures of a variety of leaves that can be found at the Park.

PRE-ACTIVITIES

Discussion will be led to recognize the various patterns in the classroom setting.

What does the design on my tie have in common with the arrangement of seats in our school auditorium?

Ans. There is a definite repetitive pattern.

Can you give examples of other patterns seen either in our school or outside?

Examples are then given.

What patterns do we as humans share?

Ans. Ears, eyes, legs, nose, etc.

In all of nature we can see various set arrangements of traits which help us to distinguish a member of one group with a member of another group. Can you give examples of some of these group traits seen in nature?

After a number of examples are given, a game can be played where a number of traits are given and the object guessed.

What has roots, a stem and a red edible plant with many seeds?

Ans. Tomatoes and any other possible answers. (Clues will be geared to the age level and cultural background of the children)

After doing several of these, the students make up their own clues. Instead of saying the answers, the students will draw each trait as it is given. Each student will be allowed one guess which can be made at any time.

OUTDOOR ACTIVITIES

Any of the six sites listed by the nature group could be used for this activity. A variety of leaves will be observed and drawn. Distinguishing traits will be noted. The students will be told to do this for as many types of leaves as is possible. Discussion will be centered on both the similarities and dissimilarities in the patterns of these leaves.

Depending on the time allowed and the curiosity of the students, an additional activity could be for the students to find other patterns on the sites.

FOLLOW UP ACTIVITIES

In the classroom, pictures of a wide variety of leaves found at Jacobsburg will be shown. Distinguishing traits will be discussed and the name of the leaf will be given, not so much that it will be learned but so that it can be used as one way of categorizing the leaves. Students will identify the leaf with their own and, by discussion, compare the descriptions in order to refine the concept of patterns.

EXTENSIONS

1. Books and guidance could be given to any students that take an interest in the various classifications of leaves. A personal collection or display could be made.

2. Students with drawing or painting ability could use it to make more detailed pictures.

3. Patterns found in other areas of nature could be studied.

Mobility of Plants and Animals

CONCEPTUAL THEME

Nature provides various ways for the seeds of plants to disperse in order to assist in the survival of the species.

OBJECTIVE

Upon completion of these activities, students will be able to distinguish some of the ways seeds are dispersed and the effects of this in the individual species survival. (Ideas gained from "Seed Dispersal", Lesson 25, pages 46,47, but are varied according to the needs of eighth grade students.)

Equipment and Materials

* Drawing paper and pencils, poster paper

PRE-ACTIVITIES

Discussion will be centered around some plant which is familiar to all the students.

We have all seen a dandelion with its white parachute. What is this parachute?

Ans. The seeds

If you look at some fields you can see many growing dandelions. What causes this great number of dandelions?

Ans. The seeds disperse.

What are some of the ways that these seeds disperse? All possible answers will be accepted after discussion shows them to be a possibility.

Ans. Wind, rain, insects, animals. Discussion will include examples of step by step dispersals. This will help the students to understand the interdependence of man's forces of nature and the wide variety of possibilities in seed dispersal.

Show the film "Seed Dispersal". Discuss the variety of dispersals and its effect on the survival of the species.

OUTDOOR ACTIVITIES

Students will observe a wide variety of seeds at the sites in Jacobsburg, They will be sketched and the possibility of dispersal of each seed will be discussed after it is listed. Students will be asked to choose one seed and by using their imagination, create an elaborate means of its dispersal.

FOLLOW UP ACTIVITIES

1. Each student will make a chart which will include drawings and writing on one seed and its possible means of dispersal. These will be presented to the class.
2. Each student will make a collection of various wild seeds seen around the school and home environment and group them as to method of dispersal.

EXTENSIONS

The following activities can be used to assist any students who show an interest to go beyond the above activities.

1. Students with artistic ability could draw more detailed pictures of the process of a particular seed dispersing.
2. Books could be used to find particular methods of seed dispersal in animals, particularly fish.

Awareness

CONCEPTUAL THEME

1. All sensations are interpreted by the senses.
2. There are different degrees of perception.
3. One factor influencing the level of perception is the varying intensity with which we use our individual senses.
4. Another factor influencing the level of perception is the amount of time spent in observation.
5. Another factor influencing the level of perception is the number of senses used simultaneously.

OBJECTIVES

Upon completion of these activities, students will be able to:

1. Realize that all experiences will be interpreted by their senses.
2. Understand there are different levels of perception.
3. Experience and relate orally and graphically the effects of varying the intensity of the use of our senses, the time of observation, and the number of senses employed on the degree of perception.

PRE-ACTIVITIES (From "Learning in the Out-of-Doors" Green Booklet)

1. Have a discussion about how we learn or know that certain things are so. Ask questions that will direct responses to a particular sense. Example: "On a warm day, how can you tell that it is raining?" (Feel it by getting wet, see it coming down and the puddles forming, hear the sound of rain as it hits different surfaces, smell it.)

2. Demonstrate that there are different levels of perception. For example: "Some people look without really seeing or listen without really hearing." A game could be played such as trying to recall the number of trees on the playground or different sounds heard on the way to school in the morning. Place a number of different items on a table and allow the students to observe them and examine them for a few minutes and then have them list and describe in as much detail as possible, the things that were on the table. Students will compare their observations for similarities and discrepancies. Repeat this with different objects and a shorter period of observation.

   Have the students close their eyes. Make a variety of sounds using objects or recordings. After each sound, have the students write what they thought they heard. Use this same blindfolded procedure for isolated use of the other senses (touch-objects placed in a box; taste-a variety of foods and drinks; smell-same as taste; sight-various objects fully and partially exposed.)

   Discuss the way various senses succeeded or failed in identifying the objects. Discuss the different levels of perception gained by using more time in observing and by using all the senses simultaneously.

OUTDOOR ACTIVITIES

1. Upon arrival to any of the marked Jacobsburg sites, the students are asked to relate the various things which they have seen, heard, touched or smelled on the way to the site.

2. Students are given a paper with five columns, each column being headed with the name of one of the senses. Using each sense one at a time, the students list anything that can be distinguished by that sense alone. (Unless the teacher is familiar with edible wildlife, the column under taste should be eliminated. If it is used, the teacher should select one or two edible plants which are found in abundance and distribute tiny portions to each student. This will eliminate the possibility of doing any harm to either the student or the environment.)

3. The students are given a paper with three areas blocked off. One area is labeled "Five seconds at five feet"; another "Five minutes at five feet"; the third "Five minutes up close".

   The students are directed to find and sketch an intricate natural organism following the directions from the labels of each boxed area. After this is completed, discussion will center on the differences in the sketches. Lead the discussion by asking, "What effect did the increase in distance have on your perception?"

FOLLOW UP ACTIVITIES

Repeat Lead-up Activities #2 using different sounds and objects. For the hearing portion of the activity, play a tape of a variety of familiar and not so familiar sounds heard both in the students' normal environment and from the Jacobsburg State Park.

EXTENSIONS

For students who are very scientifically oriented, a study could be made on the various papers done in the field of psychology on perception and the variables of time and distance.

OTHER CURRICULUM AREAS

Math

Trigonometry could be studied to find the height of various trees.

Art

See Extensions

Language Arts

Description of various sights through writing.

History

Study of the Jacob family.

Nature

Study of interdependence in nature.

Nature - Physical Change

Daniel Kasperkoski
Grade 9

LOCATION

Site 8 at the end of the mill run near the confluence of the tributary and the Bushkill Creek. The area is characterized by deep gully erosion with underground stream passages. A soil profile is easily apparent at the backwash. Vegetation includes a dense underbrush with a canopy of primarily black walnut.

CONCEPTUAL THEME

Erosion at the Mill Run Creek

OBJECTIVE

Upon completion of this activity, the student will be able to describe the reasons for vast erosional effects at the point of entry of the tributary into the Bushkill as opposed to the comparatively little erosion 25 ft. up the tributary.

CONCEPTS

1. Any increase in speed and/or volume of a stream will also increase its carrying capacity of sediments.
2. The nature of a type of soil is directly related to its vulnerability of erosion.
3. At various locations on a meandering stream, there are erosional and depositional characteristics.
4. A stream will sort out materials according to size and weight.

PRE-ACTIVITIES

1. Experiment with drops of water released from higher energy levels into cups of sand.
2. Experiment with clay and sandy soils to determine the amount of run-off variations in given lengths of time.
3. Explain why and where different sized sediments will be deposited in a stream.

ACTIVITY PROCEDURES

Have the students take measurements ten feet apart at the confluence and upward to a point forty feet upstream. This should include measurements of:

1. Flow
2. Speed
3. Width of the stream tributary

QUESTIONS

1. Where is the stream fastest moving?

   Ans. Near the confluence. A steep gradient exists here.

2. Where is the greatest flow?

   Ans. Same as #1.

3. Where is the stream the greatest width?

   Ans.

4. Where is the greatest amount of erosion?

   Ans. Near the confluence. Very apparent from the depth of the creek.

5. Where and how did man influence this stream?

   Ans.

6. What was the mill run used for?

   Ans.

7. Be able to write a paragraph about the use of the mill run.

OTHER CURRICULUM AREAS

Art

Drawings of vegetation clinging to gully bank.

Math

Calculations of width of stream at both locations, depth, elevation differences.

History

Discuss the ways the mill run was used.

LOCATION

Site 15 is characterized by a steep bank tilted at about a 40° angle, overlooking the flood plain. Undergrowth is lacking and the canopy consists of oak and hemlock. The life forms at the floor consist of mainly types that exist on decaying organic matter. Observations can be made on the effects of light and temperature on the site area.

CONCEPTUAL THEME

What growth patterns exist on a forest floor?

OBJECTIVE

Upon completion of this activity, the student will be able to understand why a quilt-like pattern of plant growth may exist on a hillside and what happens to growth of plants when competition for essentials of life is strong. The student should also realize why certain species of plant life thrive in given areas.

CONCEPTS

1. Green plants require sunlight for their life processes.
2. Green plants can and will adjust somewhat to the availability of light.
3. Certain plants have adapted to extremes of environmental conditions.

PRE-ACTIVITIES

Place a radiometer and a green plant on the desk. Hang a light over them. Turn the light on, then off.

1. What happens to the objects on the desk when the light is turned on? off?
2. What makes the radiometer spin?
3. What effect does the light have on the plant?
4. How does the plant use the energy of the sun?
5. How can you determine whether or not light affects plants?
    A. Place some plants in a dark room or box.
    B. Cover a leaf or part of a leaf to prevent light from reaching it.
    C. Test for starch in leaves covered, not covered.

ACTIVITY PROCEDURES

This activity should be carried out in the field where a particular set of circumstances exist; namely, a hillside having a northern exposure in the n. latitudes, a relatively thick growth of oaks and hemlocks with a considerable canopy.

1. Have the students examine the quantity and distribution of floor green plant life in a 100 ft. square area.
2. Students should draw a map showing areas covered by green plant growth relevant to the sun's apparent migration across the forest floor.
3. The students should attempt to find as many ways possible in which the plant life of the floor and stands of trees have accommodated to their environment with reference to the availability of light. The students may make a pictorial map of the canopy and place ten feet apart and make a count of the trees that have aligned (adjusted growth) to get more light.
4. The floor life should be examined closely and the type species of plant life should be noted. The dominant type, i.e. saprophyritic, parasitic, chlorophyll-bearing plants should be plotted as to numbers and location on a map.

QUESTIONS

1. What effect on plant life does exist because the mountain has a northern exposure?

   Ans. Less light, less green plants, relatively barren floor.

2. What relationship do you see between the openings in the canopy and the pattern of green plant growth on the floor?

   Ans. The annual diurnal patterns of light falling on the forest floor are closely related to the types and amount of plant growth.

3. Is there sharply outlined limits on the growth of plants (green) or broad areas of growth? Why?

   Ans. Broad, reflecting the annual migration of the sun.

4. Do you notice bending shifts in patterns or foliage defoliation in the trees that compose the canopy?

   Ans. Yes, this is a natural adaptation by the plants to subsist in their environment.

continued

5. Are there certain types of plants that exist in abundance in the shaded areas of the forest floor?

   Ans. Yes, mostly the fungi, mosses - non-green plants, those that require less or no sunlight.

CONCEPTUAL THEME

Man changes the environment.

OBJECTIVE

The student should understand the influence of man on the environment at this site.

Equipment and Materials

Paper
Pencil
Tape rule

PRE-ACTIVITIES

Visit Site 2 , observe the effects on the environment by man's visits. Make lists.

1. Compacted and cleared areas
2. Chimney
3. Refuse
4. Kinds of trees and vegetation
5. Flora-fauna kinds
6. Impacted flora-fauna

Introduction to Students

This site evidently was at one time, a campsite. A number of changes evidently took place as a result of man's influence. Imagine the kind of environment that existed before man.

ACTIVITY PROCEDURES

Compare the differences you can see in flora at the chimney area with that of an area 150 ft. on the periphery.

1. What kinds of plants exist at both?
2. What are the differences in size of plants?

3. What are some of the differences in the forest floor at both locations?
4. What is the difference in the amount of humus at both locations?
5. Is there a difference in the amount of erosion at both locations?
6. What is the predominant color? What is the amount of light present at both locations?
7. What is the difference in the number of animals and insects at both locations?
8. What location offers greatest food and shelter for animals and insects?
9. Which location offers least resistance to the flow of air?
10. What are some of the signs or clues as to man's influence in this area?

POST ACTIVITIES

1. Can you determine which location has been subjected to the most influence by man?
2. How has this location been changed as a result of man?
3. In the location of man's influence, be able to list the flora, fauna, colors, shapes, light amount, terrain that would have been in this area if left natural.

Nature -Succession

Mary Jane Rauch
Grade 10

SUCCESSION IN A FIELD

CONCEPTUAL THEME

1. Various types of vegetation and animal life may succeed each other on a given area in natural process known as succession.
2. The amount of light affects the vegetation growth and modifies the environment.
3. Man uses plant and animal life for food, building materials, soil stabilizers and beauty of the human habitat.

OBJECTIVES

Upon completion of this activity, students will be able to:

1. Recognize stages of succession in plants and animals from cultivated land to climax forest.
2. Develop an understanding of the effects of light on vegetative growth patterns.
3. Recognize man's part in changing his natural environment and his responsibility to his environment.

PRE-ACTIVITY

Show slides, films or film-strips showing stages of succession in a temperate zone area from an open field to a climax forest. Discuss the following questions:

1. What is meant by primary and secondary succession?
2. In Pennsylvania, secondary succession takes place on what type of sites?
3. Name the stages of plant succession and the type of vegetation found in each stage.
4. Is succession an orderly process? If so, why?

OUTDOOR ACTIVITY

Whenever an area of land is denuded of vegetation and then left to itself, it undergoes a regular series of events which result in the return to a type of vegetation which is self-perpetuating and relatively stable. Animal succession seems to follow that of plant in an orderly fashion.

A field trip is taken to an area (Sites#1 and #13) that was once a cultivated field and is now growing over with various plants. Late spring or early fall would be the best time of year. Students are asked to take notebooks and conduct the following investigations:

1. Plant growth of area
    - A. What kind of plants are growing? Can you identify any?
    - B. What environmental factors may contribute to and account for the growth?
    - C. What is the approximate age of the vegetation?
2. Animals in area
    - A. Name any seen. What type of animals might you expect to find here? Why?
    - B. Is this an ideal habitat for wildlife?
    - C. How might the habitat be improved for birds and large mammals?
3. Value of land in present condition compared to a cultivated field.
    - A. Is natural succession an improvement? Consider beauty, wildlife, soil fertility.

POST ACTIVITY

Have students work in groups and draw up plans of action to show how they think the area studied could be most wisely used. Then have each group present and discuss plans.

Further projects in reforestation, feeding ground for game, and the wise use of natural resources could be applied to the area studied.

OTHER CURRICULUM AREAS

Art

Drawings, paintings, wild flower displays could be made of the area.

Science

Succession is a science area study.

Language Art

Any report would involve language usage.

History

A discussion of the historical factors involved in the use of the area in the past could be related to the landscape.

TEACHER REFERENCES

Pa. Forest Resources No. 8, June 1974, Succession.
Benton, Allen H. and Werner, William E., Jr. Manual of Field Biology and Ecology 5th ed.
Andrews, ed. A Guide to the Study of Terrestrial Ecology.

AWARENESS AND APPRECIATION

CONCEPTUAL THEME

1. Living features of a specified area change according to the seasons of the year.
2. Beauty in a natural environment is not limited to one season of the year.
3. Man's influence on his natural environment adds to the effects of seasonal changes.
4. The senses enable man to be aware of changes in the natural environment.

OBJECTIVES

Upon completion of this activity, students will be able to:

1. Recognize change in plant and animal communities within a designated area due to seasonal changes.
2. Develop an aesthetic appreciation of the natural environment.
3. Recognize some of the effects of man's influence on the natural environment.
4. Develop the use of their senses in perceiving change.

PRE-ACTIVITY

Ask the class the following questions:

1. What things have you seen today? (List 5)
2. Do you remember anything about them?
3. What were their colors?

4. Did they make noise?

5. How did they smell or taste, if possible?

6. Are any of these things changing in any way? If so, how? What is causing these changes?

7. If you could change some of the things you saw, what would you do to them and how would you go about doing it? Would your changes result in side effects?

8. Which things represented a feeling of beauty or comfort, or enjoyment to your life?

Equipment and Materials

Clothesline wire hoops measuring 88 3/4" and divided by twine into four quadrats

*Paper and pencils

ACTIVITY PROCEDURES

Divide the class into groups of five. Have the students toss their hoops on areas of the park. With a student working in each quadrat and one recording the information, have them count the number of living things they find. It is not necessary to identify everything by name. Interest should be in numbers and varieties. Vegetation, animate and inanimate items should all be counted and classified. This hoop count can be conducted in the fall and again in the spring at the same areas.

1. What obvious changes have taken place in the area?

2. Why have some plants diminished in number while others have increased?

3. What happened to all the seed and fallen leaves?

4. What new plants and insects have come into the area?

5. Is there evidence of litter?

6. Is there evidence of man's activities in this area?

POST ACTIVITIES

1. Have the class compile and compare their samplings.
2. How do you think seasonal changes affect the plant life? The animal life?
3. Further projects could be conducted concerning protection of plants and animals from bad weather.
4. Further projects could be conducted on ways in which plants and animals take advantage of good weather.

OTHER CURRICULUM AREAS

Math

Measurement

Art

Beauty of area during seasons.

Science

Classification of living things.

Language Art

Story could be written about area.

History

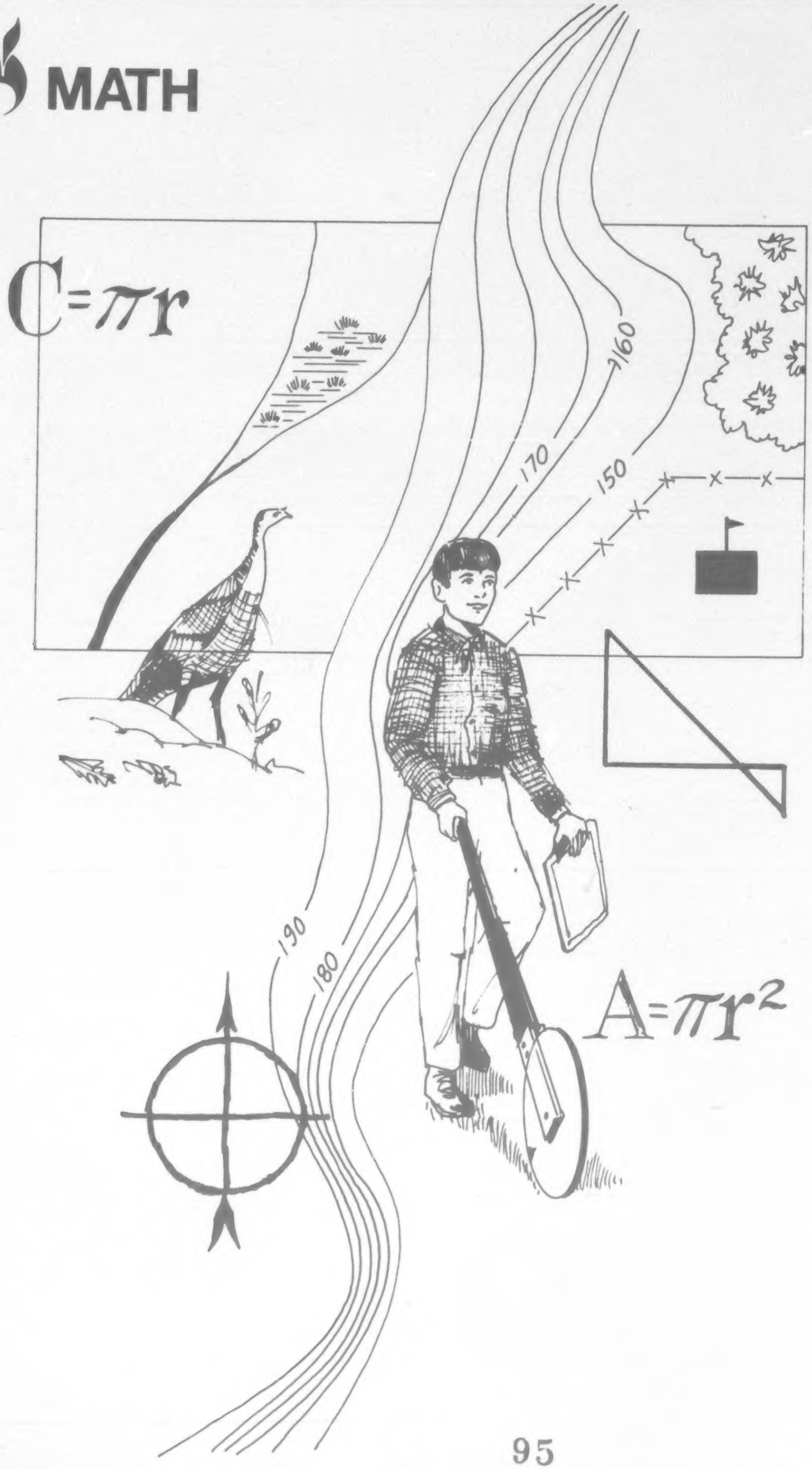
Changes made by man in the past that affect the area.

TEACHER REFERENCES

Benton, Allen H. and Werner, William E., Jr.
Manual of Field Biology and Ecology, 5th ed.

Brennan, Matthew J. ed. People and Their Environment
Grades 1 to 12.

MATH


C=πr
160
170
150
190
180
A=πr²

Math·Computing

Karen Voda
Grade 5

CONCEPTUAL THEME

To use a $\frac{1}{25,000}$ of a hectare hoop to study the diversity of sets in nature.

OBJECTIVES

Upon completion of this activity, students will be able to:

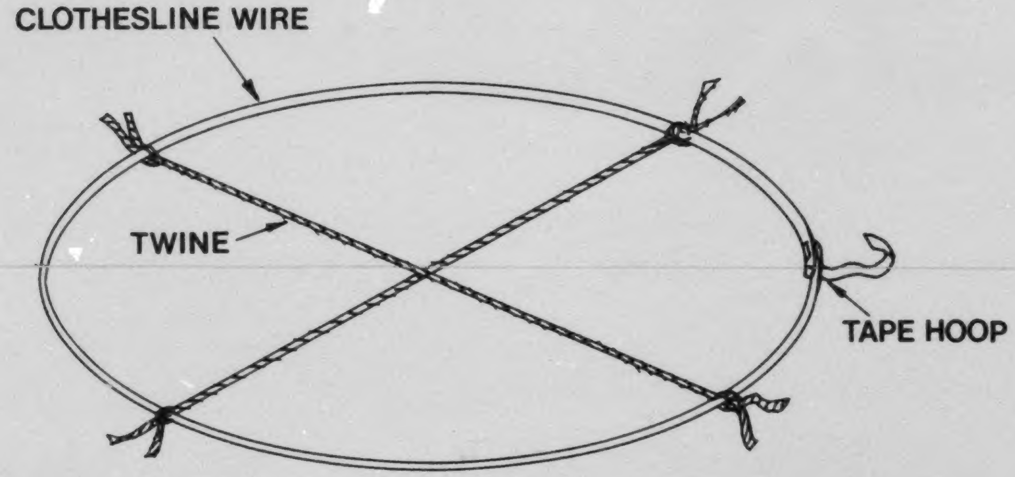
1. Compute the area and circumference of $\frac{1}{25,000}$ of a hectare through the making of a hoop.
2. Name a universal set for a given set.
3. Compute number of plants, animals, insects and non-living elements in a hectare by adding four zeros to total counted in hoop.
4. Compute the percentage of plants, animals, living and non-living elements in a hectare.
5. Graph number of varieties or per centof varieties.

Equipment and Materials

Clothesline wire and twine to make the hoop (2.25m plus 1cm for overlap for each hoop).

PRE-ACTIVITIES

1. Discuss why you would take a small sample, rather than count the whole area. In order to understand how to project a population of a small area to a larger area, have the students count the number of boys and the number of girls in the school by multiplying each figure by the number of rooms.
2. To understand the size of .4 of a hectare (one acre), have the students stand on the 90 yd. 27" line of the football field. The larger segment is the area to project to a hectare.



3. Make a $\frac{1}{25,000}$ of a hectare hoop by using clothesline wire. Cut the clothesline wire 2.25m plus 1cm for overlap. Tape the ends into a hoop 2.25m. This circle can be divided with twine into four quadrants. (conversions to acre 2.25m = 88 3/4")

4. If it is within the capabilities of the students, have them figure the area and circumference of one twenty-five thousandth of a hectare.

   If 10,000 m^2 is the area of a hectare, then the area of $\frac{1}{25,000}$ would be $.4m^2$.

$$\begin{aligned} A &= \pi r^2 \\ .4 &= 3.14r^2 \\ .1273885 &= r^2 \\ .3569152 &= r \end{aligned}$$

$$\begin{aligned} C &= 2\pi r \\ C &= (2 \times 3.14)r \\ C &= 6.28 \times .3569152 \\ C &= 2.25\text{m} \end{aligned}$$

5. Discuss what kinds of sets one could study outside. Have the children form these sets into four universal sets of plants, animals, insects and non-living elements. If you want to establish diversity in working with sets, have the children establish ways to classify their subsets: shapes, color, texture.

ACTIVITY PROCEDURES

1. Have the students toss their hoops on the ground. With a student working with each quadrant and one recording the information, have them count the number of elements they find according to the sets that were established.

2. Conduct the hoop count in different vegetation areas: the orchard, the forest floor. Compare these results and have the children conjecture about the areas. If they classified in sets of plants, animals, insects and non-living things, they could discuss the interrelationships of these sets within an area. What differences were there? What was in one area that the other lacked? What are the consequences of man's activities in the area? What makes it possible for the animals, plants or insects to live here? What was evident in one area or the other for a particular plant or animal to live here or not to live here?

3. Conduct the hoop count in different areas in the park and compare it with a hoop count done in different areas around the school. The children can answer the same questions as in #2.

POST ACTIVITIES

1. Discuss what each hoop group found. To project their findings to .4 of a hectare, have the children add four zeros to their figures.

2. Using the data collected in the field, graphs can be constructed to show the number of varieties in nature.

3. Have the students compute the per cent of plants, animals, insects and non-living things. These figures can also be graphed.

EXTENSIONS

Conduct the hoop count during different seasons of the year. Once they have tallied the number for each established set, the students can discuss what changes have taken place in each area. What obvious changes took place? Why was there a change? What happened to the plants, animals and insects in the fall and winter?

OTHER CURRICULUM AREAS

Art

Using the hoop, count objects by texture, shape and color. The students can sketch what they find in each quadrant.

Science and Nature

Conduct the hoop count. Using the totals tallied in the hoop, the students can discuss the diversity, interrelationships, adaptation and change in nature. The activity procedure and extension detail the study.

Language Art

Accurate reporting can be done by having the students record the data and report to the class. Creative compositions and tall tales can be written about the area examined.

History

Students could conjecture what they might find if they conducted the hoop count again in 50 or 100 years. Discuss why these changes would take place.

Students also could compare price costs of a parcel of land 100 years ago to today.

Math · Contour Mapping

T. Peter Mindler
Grade 6

OBJECTIVES

Upon completion of this activity, students will be able to:

1. Demonstrate knowledge of contour lines and intervals.
2. Construct and/or use an open sighting level.
3. Establish horizontal base station (BM) and use a sighting level to measure vertical and transverse distances from BM to the crest of the hill.
4. Construct a contour map of a slope by plotting data collected.

Equipment and Materials

1	Board mounted contour map of Park Area
10	Sighting levels (Swift)
10	Five metre metric tapes
6	Plastic clothesline or durable twine (10 metre)
15	Metre sticks
30	Aluminum stakes

PRE-ACTIVITIES

1. PRECONCEPTS FOR DISCUSSION

What symbols do we use to indicate we are working with three dimensions? Cartographers (mapmakers) use topographical lines which graphically delineate natural or man-made features to show their relative positions and elevations.

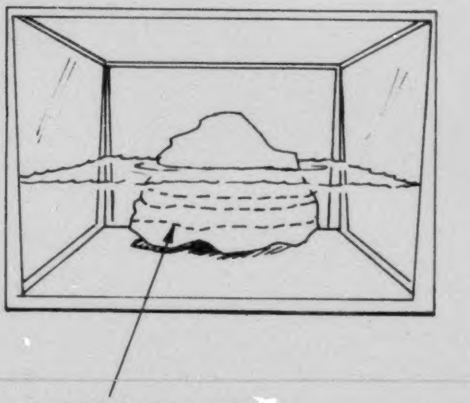
A contour line (contour for short) is a line passing through points having the same altitude above or below sea level.

A contour interval (CI) is the vertical distance between two successive contour lines indicating to the map reader the local variations in elevation which exist in the real world.

2. CONTOUR DEMONSTRATION

Materials - aquarium or large watertight container, irregular shaped rock, water, waterproof marker.

Place the rock in the empty container. Add sufficient water to raise the water level one inch, then draw a line just above the water all the way around the rock. Raise the level one inch at a time and repeat the marking process. Students should note delineation of elevation on the rock.

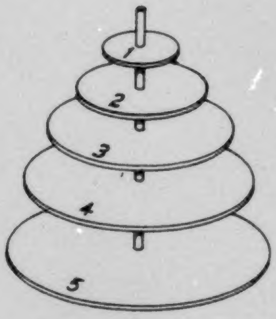


CONTOUR LINES

3. CONTOUR DEMONSTRATION

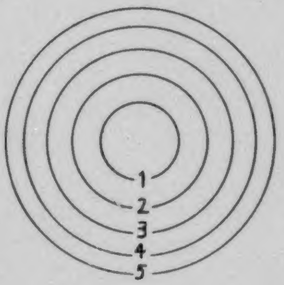
Materials: scissors, colored construction paper or crayons, cardboard or oak tag patterns.

Provide a sheet with outlines of five circles (color code and diameters: red-12cm, green-10cm, yellow-8cm, blue-6cm, orange-4cm). Color and arrange concentrically inside the largest circle and label in a series such as 5-4-3-2-1, 50-40-30-20-10, etc. The smallest circle gets the highest number. Lines, not spaces, should be numbered. Students should arrange and observe different patterns. To change to a three dimensional representation, mount on soda straw legs. Students should look at the models from many angles for changes in silhouette and shape. They might then try to draw a flat representation of their observations.



A

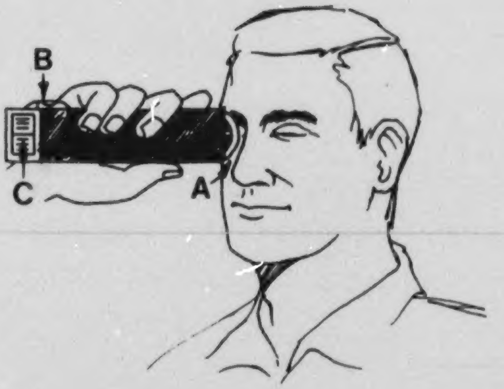
CONTOUR DRAWING of 'A'

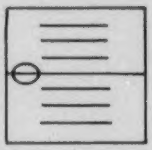


101

4. USE OF A COMMERCIAL SIGHTING LEVEL

Hold the level with the eyepiece (A) close to the eye, the bubble (B) on top, taking care not to cover the bubble with fingers. Slowly raise or lower the opposite end (C) or objective glass end of the level until the image of the bubble seen though the eyepiece is centered on the long horizontal line on the objective glass. Any point in the distance appearing directly behind the horizontal line is on a level with the eye of the observer. A metre stick held below the level will ensure a measurement of one metre vertical rise.





5. MAKING A SIGHTING INSTRUMENT

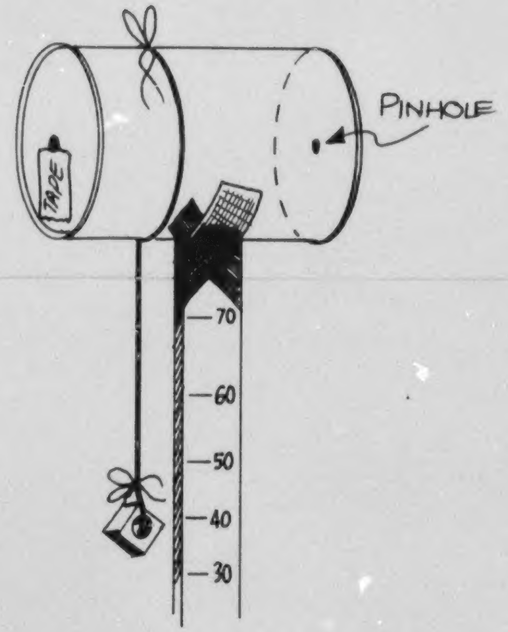
A student-made sighting instrument may be substituted for the Sighting Level available commercially. Each student or team will need the following:

Empty flip-top beverage can
Length of string over one metre in length
Small weight, such as bolt, nut, fish weight, plumb bob
Masking tape
Metre Stick

Use a nail to punch a small hole in the center of the bottom of the can. Put masking tape over the flip-top opening except for a small hole in the center. This will create eye holes at opposite ends of the can. Let the students practice sighting objects for a short time.

Each of the students should then attach weights to one end of the string and tie the other end around the center of the can. The string may be wrapped around the can for storage.

Tape the sighting instrument to the top of a metre stick as shown. It may be necessary to move the string to allow free fall of the weight. In use, the string and stick should be parallel. Objects sighted through the can will be one metre higher in elevation than the base of the stick.



ACTIVITY PROCEDURES

To promote effectiveness of this activity, it is recommended that students complete at least preactivities 1 and 4. Students should work in teams of three; an observer, a position person and a recorder-measurer. Teams should proceed to site M-6 and select an accessible point near the base of the slope as BM. Work from this point and establish secondary stations along the same elevation. Each secondary station should be spaced at five metre intervals.

White clothesline may be stretched between these points to serve as a physical representation of a contour line. CI will be one metre and is easily measured by placing the Swift sighting level on top of a metre stick and following these procedures:

1. Observer will direct the position person to a point up the slope one metre higher than their present position.

2. Each team will mark the position with a stake, then stretch another clothesline along this contour line.

3. Each team will check maintenance of the five metre intervals and align themselves accordingly.

4. Recorder will measure the transversed horizontal distance and record the measurement on the data sheet (see data sheet).

5. Procedures are repeated to the crest of the hill (repeated use of the clothesline is optional).

POST ACTIVITIES

Upon return to the classroom, team data should be compiled to class data for the entire slope. This data can be used to plot elevation on graph paper. Enlargements of these grid patterns may be used to build a 3-D model of the slope.

EXTENSIONS

Teacher Reference - Science and Children. October, 1973, Volume 11, Number 2.

OTHER CURRICULUM AREAS

Science

Discuss tree types and the reasons for lack of undergrowth at sites where differences are seen.

History

Early Measurement - "Measurement of Man" series from Filmstrip House, Inc., can be used to relate early and modern map making.

Nature

Discuss reasons for slope and surrounding topography.

Art

Use slope to show perspective and its representation in drawing.

Math ·Maps & Graphs

Rose M. Smith
Grades 7-8-9

MAPPING

GOAL

To develop an understanding of the importance of maps and compasses to travel, property ownership, and defining location of important features in any area.

OBJECTIVES

1. To enable students to measure by pacing.
2. To introduce students to the various types of maps and their uses.
3. To learn to read maps and to utilize map symbols in the drawing of a simple sketch map.
4. To develop the ability to place objects on a simple scale map in relation to the direction and distances between the actual objects in the field using compasses and clinometers.
5. To develop the skill to make elementary maps to a suitable scale.

NOTE

Because of the complexity of this project, it has been necessary to develop considerable preparatory material that should be mastered and understood before the work in the field is attempted at the park. However, if students are somewhat familiar with these techniques and procedures, this section may be omitted or quickly reviewed by the students and teacher.

This module has been constructed for use in three distinct time units:

1. Preliminary work - this needs to be done in the classroom and school area prior to a trip at the park.
2. Field work at the park.
3. Follow-up activities back at school.

Site Description

Former Girl Scout Camp Site

Mapping to be done in the entire open area around Site 3

Equipment and Materials

- 10 Clipboards
- 30 Pencils
- 10 Measuring tapes
- Graph paper
- Twine or heavy string
- 20 Meter sticks
- 20 Simple proctractor or Scout compasses
- 20 Clinometers
- 20 Protractors
- 20 Stakes for defining plots

Prospectus for Module

Preliminary

1. Determine the length of a pace.
2. Sketch map using symbols.
3. Scale mapping.
4. Direction and distance in map making (includes use of a compass and clinometer).
5. Accurate map construction.

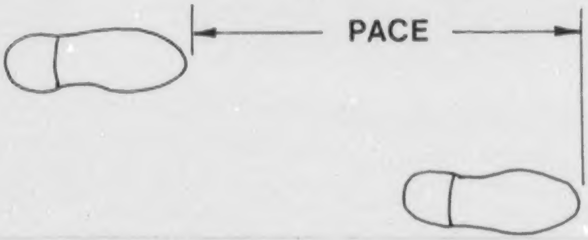
Field Work

1. Data gathering in Jacobsburg Park, Site, using compass and clinometers.
2. Construction of the map from the data.

PRE-ACTIVITY - Prior to work at State Park

Measuring Your Pace

To make a map, it is frequently helpful to measure by your own pace. In order to do this, you must know the length of your pace.



How to Determine Your Pace

1. Mark off 100 feet on level ground.
2. Travel the distance marked off in a normal walk. Do this twice and count your steps each time.

Number of steps taken first time

Number of steps taken second time ________

Total steps

________ ÷ ________ = ________
Total distance ÷ Total number of steps = your pace

Using Your Pace

1. When pacing, be sure to walk in a normal easy stride.
2. Count the number of steps it takes to walk the distance you need to know.
3. Multiply the number of steps taken times your pace.

________ X ________ = ________
Number of steps X your pace = Distance

How far is it from:

1. Your classroom to the office and back? ________
2. Your classroom to the gym and back? ________

108

ACTIVITY PROCEDURES - Jacobsburg State Park, Site

Using compass and clinometer measurements for obtaining field data for map construction

Equipment and Materials

Compass	Pencils
Clinometer	Stakes and twine
Paper	Meter or tape

1. Divide class into groups, etc.

2. The direction finder should select a starting point (a) and find 0° North and 90° East with a compass.

3. Plot should then be defined and measured, using the stakes, twine and appropriate measuring device.

4. From the starting point, the direction finder should take a compass/clinometer bearing on the feature to be mapped.

5. The distance finder should determine the distance between the starting point and the feature by direct and/or indirect methods. This distance is also tabulated by the recorder.

6. All other features should be located and recorded by repeating these steps. The original point (A) is used in each case to determine the azimuth and the distance.

7. Sample of Data Sheet:

Feature	Azimuth	Distance
A to B (tree)	30°	14 steps or 28 ft.
A to C (swing)	45°	20 steps or 40 ft.

POST ACTIVITY (After mapping has been completed)

1. Have the students compare maps to discover similarities or differences.

2. If some of the groups did all of their sighting with a compass instead of using both the compass and the clinometer, discuss the differences in these maps.

3. Combine the map into one large map and compare notes on them.

4. Using an appropriate scale, enlarge the map and put it on display in the library or hall where other students may be able to examine it and discuss it.

5. Have the students use the library to find out what instruments are used by professional surveyors. If possible, have students interview a surveyor, or someone involved in highway construction, in order to relate what they have been doing in this field of work.

6. Ask professional men who use maps (railroad, airplane, highway men, surveyors, contractors, etc.) to speak to the class and show them some of the instruments they use for measurement and for map making.

7. Have the students use the library to find out what kind of surveying instruments the early settlers used in America.

8. Make a display of various maps, instruments for measurement, and professions involving measurement and mapping.

Clinometer for Locating Features in Degrees

CONCEPTUAL THEME

Accurate measurement of degrees can be done with a clinometer.

PRE-ACTIVITY

1. Familiarize students with the principles of the protractor.
2. Have students use commercial clinometers for locating objects by degrees.
3. Have students construct simple clinometers for use in mapping.

ACTIVITY PROCEDURES

Using a clinometer for locating objects to be mapped:

1. Have students practice sighting and reading location of several objects in a field, having first established the point of origin.
2. Divide class into groups and proceed as in previous field work, gathering data on same plot that was defined with a compass. Students should first use the compass to establish North and South, and then the clinometer to determine the location of all the objects by degrees.
3. Gather data and return to classroom.

POST ACTIVITY

1. Construct maps.
2. Compare with the maps of the areas in which a compass had been used to locate objects. Determine which instrument seems to be the most accurate.
3. Compare maps.
4. Composite map of all the area.

CONSTRUCTION OF A CLINOMETER

Materials

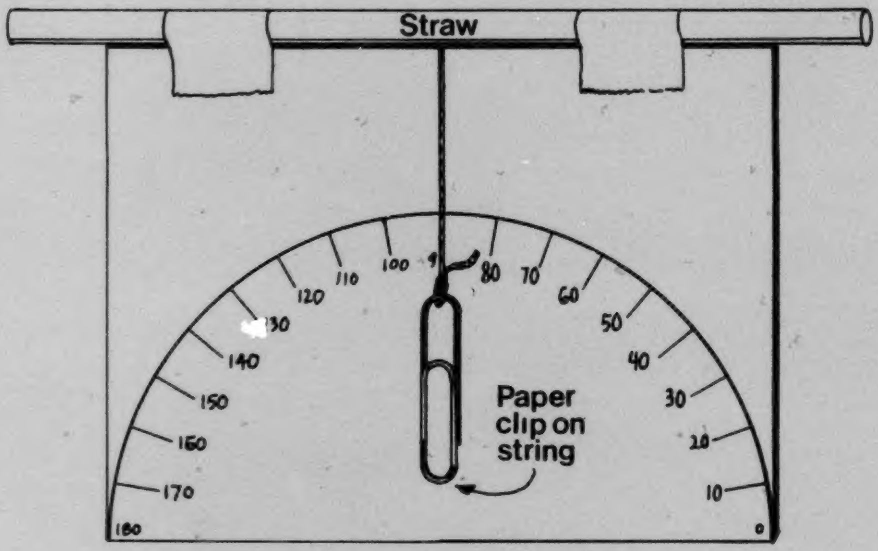
Protractors	Soda Straw
Filing Cards	Paper Clip

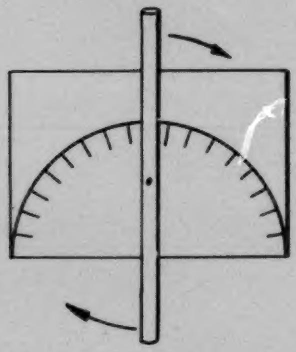
1. On a filing card, draw an accurate facsimile of the protractor.

2. Tape the straw at the top for a sight viewer.

3. From top center, drop the string with paper clip attacher for a weight. See diagram.

4. Another version would allow the straw to be pinned at the center and moved at the measure of the angle. This could be used for horizontal angle measurements.


Straw
180
170
160
150
140
130
120
110
100
9
80
70
60
50
40
30
20
10
0
Paper clip on string



Direction in Mapping

CONCEPTUAL THEME

1. Direction is the geographic relationship of two objects.
2. A compass works because of magnetic attraction.
3. A clinometer enables us to read direction in degrees.

PRE-ACTIVITIES

1. Discuss different methods of finding direction, such as the use of the North Star, compasses, sun, and clinometer.
2. Introduce the students to the cardinal points of direction. Locate these points on different kinds of maps.
3. Familiarize the students with the parts of the compass.
4. Have a discussion about degrees and how they relate to the cardinal points. Use both a compass and a clinometer to read direction in degrees.
5. Concepts such as deviation, declination and variation may be included with better groups.

ACTIVITY PROCEDURES

1. Follow a compass course with direction given in terms of degrees.
   A. The students should practice finding a given direction from a degree reading.
   B. Make up your own compass course or use a compass game.
2. Lay a course to determine the degree reading for someone else to follow.
   A. Students should practice finding the bearing of different objects in the field.
   B. Have students work in groups and lay a compass course for another group to follow.

POST ACTIVITY

Discuss the use of the compass and clinometers with maps. The compass is used to locate North and South, so the map will be laid out in the right direction.

Once the North and South has been established, objects can be located in degrees with a compass or a clinometer.

Sketch Mapping

CONCEPTUAL THEME

A map is a picture of an area using symbols to represent places and things.

PRE-ACTIVITIES

1. Discuss what maps are and explain the various kinds of information that can be obtained from them. Include road maps, topographical, political, airplane and relief or contour maps.

2. Have a discussion of how maps are made, including the use of an aerial photo as the basis for many maps.

3. Define the nature and use of symbols on maps. A symbol may be defined as a graphic representation of a feature that is located in the field. Have students examine symbols and keys on maps and then make up some of their own symbols of included material.

Equipment and Materials

Sketch map
Unlined paper
Pencils or crayons
Clipboards
Measuring tape or meter sticks
4 Stakes
String

ACTIVITY PROCEDURES

1. Have the students walk over the school grounds and select an area which they want to map. Stake it out.

2. The students should start with an object in one corner of the area selected and draw its symbol in the appropriate corner on the paper.

3. All features should be represented by symbols. Exact distances and directions may be by-passed until a later time.

POST ACTIVITY

1. Compare the maps of the students to determine differences and similarities.

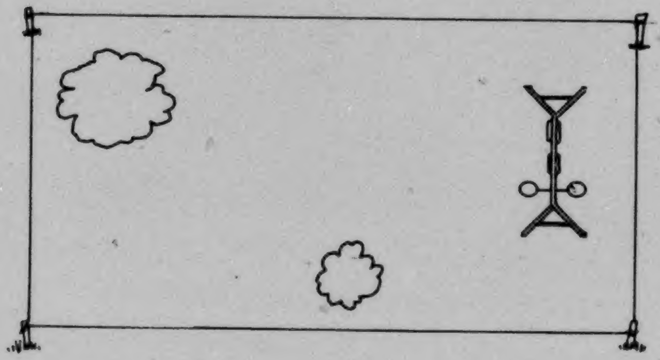
2. Have a discussion on the uses of the maps and how the maps made could be improved - areas of inaccuracy.

3. Re-examine maps to note need for exact distances and direction. Use keys on the maps for this purpose.

DESIGNATING A PLOT FOR MAPPING

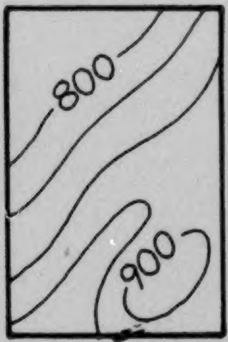
1. Select an area of the school grounds containing several features (trees, fence flagpole, playground equipment, etc.) that are to be placed on a map.

2. Designate the physical area to be mapped by placing four stakes in the ground to form a square or rectangle. The features to be mapped should be located within the boundaries formed by the four stakes.

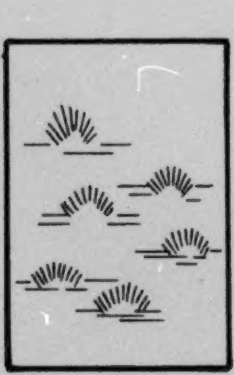


3. Connect the four stakes with a string, placed on the ground, to outline the perimeter of the plot.

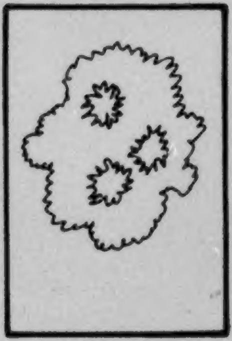
MAP SYMBOLS



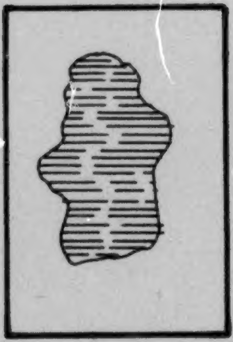
CONTOUR LINES



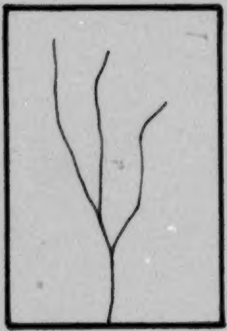
SWAMP



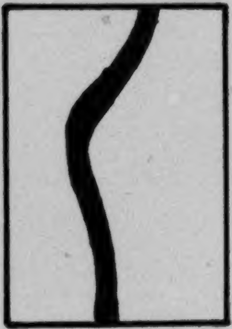
FOREST



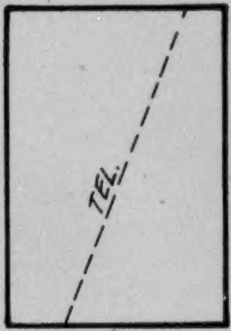
LAKE OR POND



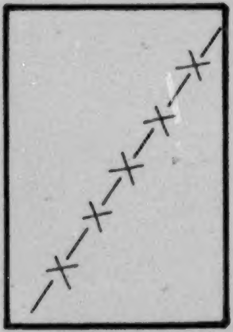
NARROW STREAM



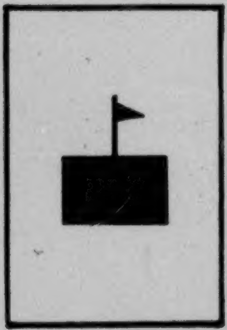
WIDE STREAM



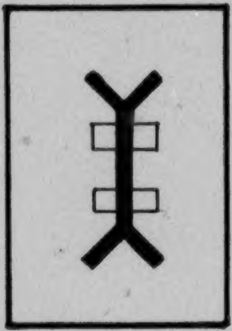
TELEPHONE LINES



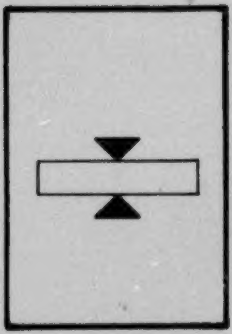
FENCE



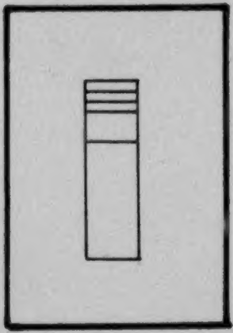
SCHOOL



SWING



SEE-SAW



SLIDE

SCALE MAPPING

CONCEPTUAL THEME

A scale map tells the actual physical distance between places on a map.

PRE-ACTIVITIES

1. Define scale as the ratio between the distance on the map and the actual distance in the field. Have the students practice drawing to scale an outline of the classroom.

2. Have the students look at different types of maps and interpret the scale used on each.

Equipment and Materials

Graph paper
Pencils
Meter sticks

ACTIVITY PROCEDURES

1. Help students select and stake an area to be mapped. Determine the size so that an appropriate scale can be established.

2. The sides of the area should be placed on the paper first, then the features in the appropriate places.

POST ACTIVITY

1. Have the students compare the maps they made to determine the differences and similarities.

2. If adjacent areas are used, all of the maps could be put together to make one large map.

3. Have the students enlarge the map and determine symbols for each of the objects in the field. This enlarged map can be placed on display to help visitors orient themselves to the school area.

Making a Sketch Map to Scale

Equipment and Materials

8-1/2 x 11" Graph paper
Pencil
Rule or yardstick, tape measure

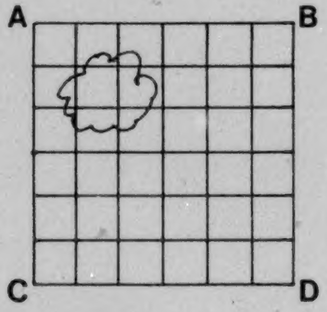
ACTIVITY PROCEDURES

1. Measure the sides of the plot to be mapped by direct or indirect methods.

2. Determine a scale that allows the area to be placed on the paper, converting the length of each side to squares.

   2 steps or 3 feet = 1 square of the graph paper
   a side 15 feet long = 5 squares

3. Draw an outline of the plot on the graph paper. Letter each corner so that it is easier to orient the map with the field.



4. Start at any object in the field and measure the distance, using the same method as above, to the two nearest sides of the area.

5. Convert the measured units to scale units.

   2 steps = 1 square of the graph paper
   object to side AD = 4 steps = 2 squares
   object to side DC = 6 steps = 3 squares

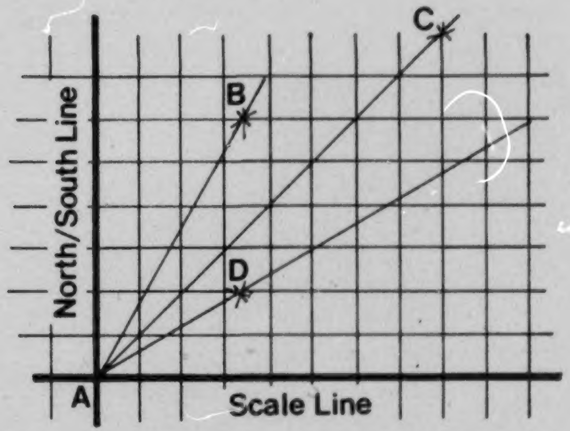
6. Place a point on the map representing the object in the appropriate place in relationship to the proper sides.

7. Repeat this procedure until all the features in the field are mapped.

The Making of the Map on Graph Paper

Equipment and Materials

8-1/2 x 11" Graph paper	Data from the field
Protractor	Straight edge
Drafting Compass	



ACTIVITY PROCEDURES

1. Draw a scale line (east-west line) the full width of the paper about one inch from the bottom.

2. Determine a scale that will allow all of the features to fit onto the paper. For example, 1 square = 5 steps or 1 square = 5 feet.

3. Draw a north-south line perpendicular to the scale line one inch from the left margin of the paper.

4. Place a dot at the intersection of the north-south line with the scale line. This represents A and zero on the scale line.

5. Place the protractor over the north-south line with the center at 0 and mark 30° (the azimuth reading of object B).

6. Draw a line from A at an angle of 30°.

7. Set the width of the compass by the scale the distance B is than A and draw an arc. The intersection of the arc and the line drawn at 30° is the location of B on the map.

8. Repeat steps 5, 6 and 7 to determine the location of each of the other features on the map.

9. Erase the lines in 6. Symbols can be used for each feature.

Math-Compass Use

Michael Łenda
Grade 8

CONCEPTUAL THEME

The purpose of this module is to give students the opportunity to work with compasses in an outdoor setting as well as developing their math skills.

OBJECTIVES

At the completion of this activity, the student should be able to:

1. Find direction with a compass.
2. Name the main parts of a compass.
3. Answer the mathematical problems he or she encounters along the course (keyed to grade level).

Equipment and Materials For 30 students

1 Demonstration Silva Protractor Compass
20 Silva Compasses
20 Diameter tapes

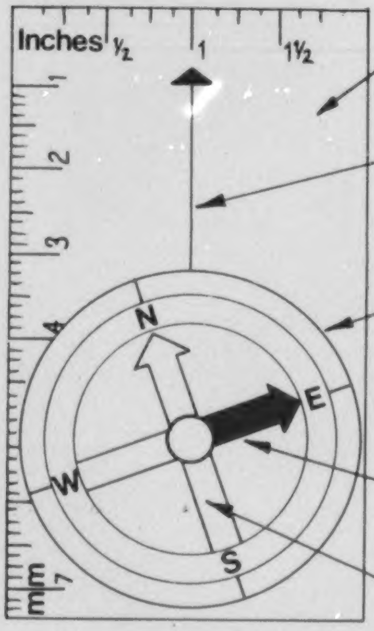
LEAD UP ACTIVITIES

1. Discuss different methods of finding direction, such as the use of the North Star, the sun and the magnetic compass.
2. Students should learn the three main parts of the compass (the needle, compass housing and the base plate) and their functions.
3. Introduce the students to the cardinal points of direction (N, S, E, W) and locate these points on different types of maps. Relate degree readings to the cardinal points.
4. Concepts like deviation and declination may be introduced to higher ability groups.

PRE-ACTIVITY

Introduction to the Compass:

The type of compass used at Jacobsburg State Park is the Silva Compass. The first thing to do is familiarize the students with the compass. Have them "play" with it for a few minutes. Have them twist and turn it and see how it reacts. Warn them to handle it carefully and to avoid dropping it.



Transparent Base - has direction of travel arrow, scale of inches and millimeters for computing distance.

Direction of Travel Arrow - red arrow on the base. points to the direction you are going.

Compass Housing - "houses" the needle, rotates on the transparent base, graduated in 360° (2° for each division on rim), read at the intersection of housing and direction of travel arrow.

Magnetic Needle - red and white needle, red end points to Magnetic North.

Orienting Arrow - stationary arrow inside housing, indicates 360° (North).

1. Holding the Compass - The compass is held in the palm of one hand, at waist height, with the direction of travel arrow pointing perpendicular to the body. It should be held level so that the magnetic needle can move freely. The upper forearm should be held against the body to steady the compass.

2. Set the compass for direction by turning the housing until the desired azimuth (reading) is in line with the direction of travel arrow.

3. Hold the compass in a level position in the palm of your hand with the direction of travel arrow pointing the way you are facing.

4. Turn your whole body including your feet slowly until the red magnetic needle is pointing North in the compass housing. At this time, it will be superimposed on the block orienting arrow. The direction of travel arrow will be facing the desired azimuth.

5. To follow the desired direction of travel, either select a landmark directly in line with the direction you are now facing or send your partner ahead so that he or she is in line of travel, then walk to the land mark or to your partner without looking at your compass. When you arrive there, repeat the process, if necessary, and pick out a new landmark. Repeat until you reach the next compass course station.

Compass Course

Jacobsburg State Park, Henry's Woods Natural Area. The compass course can be used to help orient the students to the area. It reinforces their knowledge of the compass and can be used to raise questions in any curriculum area. Preparation for use of the compass course would require the teacher to go through the course and place the instruction sheets at each station prior to the students' arrival. The starting point and compass headings to get to the next station are given below.

At each station, the students can be required to answer a question appropriate to their mathematical ability level before going on to the next point. This would require them to follow the course, as well as give them practice in mathematical skills. It is suggested that the teacher make up the questions for his students. Sample questions are provided here. Questions or instruction need not be confined to mathematical areas.

Station 1 - Chimney fireplace near Site 2
100° to Station 2, about 95 paces (235 ft.)
Station 2 - 340° to Station 3
Station 3 - 80° to Station 4
Station 4 - 195° to Station 5 (25 paces)
Station 5 - 180° to Station 6
Station 6 - 280° to return to Station 1

Station 1 Questions (100°)

1. 25 x 4 = compass reading to Station 2.
2. 67 + 33 = compass reading to Station 2.
3. $\frac{30}{100} + \frac{9}{25} + \frac{17}{50} \times 100$ = compass reading to Station 2.
4. The number of centimeters in a meter is the compass reading to Station 2.
5. 63.7 + 22.6 + 13.7 = compass reading to Station 2.

Station 2 Questions (340°)

1. Find the diameter of the tree in centimeters, multiply it by 5 and the answer is your next compass reading.
2. 130 + 67 + 96 + 47 = compass reading to Station 3.
3. 170 x 2 = compass reading to Station 3.
4. 122.65 + 96.63 + 120.72 = compass reading to Station 3.

Station 3 Questions (80°)

1. 20 x 4 = compass reading to Station 4.
2. $4^3 + 4^2$ = compass reading to Station 4.
3. 26 + 43 + 11 = compass reading to Station 4.
4. 320 ÷ 4 = compass reading to Station 4.
5. 155 - 75 = compass reading to Station 4.

Station 4 Questions (195°)

1. $(45 \times 4) + 15$ = compass reading to next station.
2. $50(4) - 5$ = compass reading to Station 5.
3. Boiling point of water (°C) + 95 = compass reading to Station 5.
4. $1021 - 826$ = compass reading to Station 5.
5. $111 + 46 + 38$ = compass reading to Station 5.

Station 5 Questions (180°)

1. The number of degrees included in a triangle is the next compass reading.
2. $(32 \times 6) - 12$ = compass reading to Station 6.
3. $(400 - 40) \div 2$ = compass reading to Station 6.
4. $233 - 53$ = compass reading to Station 6.
5. $115.7 + 62.4 + 1.9$ = compass reading to Station 6.

Station 6 Questions (280°)

1. $10^2 + (40 \times 2)$ = compass reading to Station 1.
2. $(10^3 - 10^2) - 620$ = compass reading to Station 1.
3. The reading from Station 5 + 100° = compass reading to Station 1.
4. The number of degrees in a circle - 80 = compass reading to Station 1.
5. $(145 \times 2) - 10$ = compass reading to Station 1.

OTHER CURRICULUM AREAS

This module can easily be modified to work on concepts from any other discipline. The students can be required to answer questions from history or science or any other area. In this case, the sheet at each station would include a question and the degree reading. The student would then be required to hand in his answer sheet. Some other specific suggestions are listed.

Art	Draw a sketch of something you see at the station.
Language Art	Describe the terrain or natural features. Work games could serve as the questions at the Station.
History	Research early methods of finding direction.
Science	Study how a compass works.
Nature	How do animals find direction? Why do they migrate?

Math · Measuring

Jean Mikletz
Grade 9

CONCEPTUAL THEME

Guessing, estimating, use of body measurement, construction and use of measuring instruments.

OBJECTIVE

Provide direct experiences that will help relate and demonstrate the concepts of mathematics by providing practical experience in the out-of-doors.

Equipment and Materials

Sighting levels
*Measuring wheels
*Diameter tapes
*Merritt Hypsometer
*Clinometer (theodolite)
*Biltmore stick

Stakes
Hammer
Rope
Meter sticks
Surveyors pins (optional)

*These instruments may be constructed by students as introductory activities. Instructions for assembly may be found on the following pages.

ESTIMATING DISTANCES - ACCESSIBLE AND INACCESSIBLE

AREAS USED

Open sections of Henry's Woods (former Girl Scout Camp) and fields.

Along paths.

Across Bushkill Creek along Henry's Woods

OBJECTIVE

To learn how to estimate width of objects (fields, streams, gullies) using methods not dependent upon conventional measurement techniques.

PRE-ACTIVITY

1. Introduction to right triangles and similar triangles.
2. Construction of measuring wheels.
3. Calculating areas of squares and rectangles.

ACTIVITY PROCEDURES

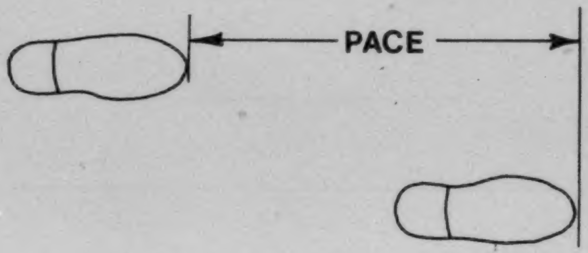
See following sheets

POST ACTIVITY

Comparison of "measured" distances using different techniques. Explain/discuss variations and accuracy of each.

Advanced work using parallex for determining distance of far away objects - e.g. moon.

Activity 1 - Pacing



How to Determine Your Pace

1. Mark off 30 meters on level ground.
2. Travel the distance marked off in a normal walk. Do this twice, and count your steps each time.

Number of steps taken first time __________
Number of steps taken second time __________

Total steps taken __________

__________ ÷ __________ = __________
Total Distance Walked ÷ Total no. of steps taken = Your Pace

Using Your Pace

1. When pacing, be sure to walk in normal easy strides (the same one you just used to determine your pace).
2. Count the number of steps it takes to walk the distance you need to know.
3. Multiply the number of steps taken by your pace.

__________ X __________ = __________
No. of steps taken X Your Pace = Distance Traveled

Mark off distances in aforementioned areas to be measured by above method.

Measure same distance using measuring wheel and tape.

Determine area of open field using above methods of measurement.

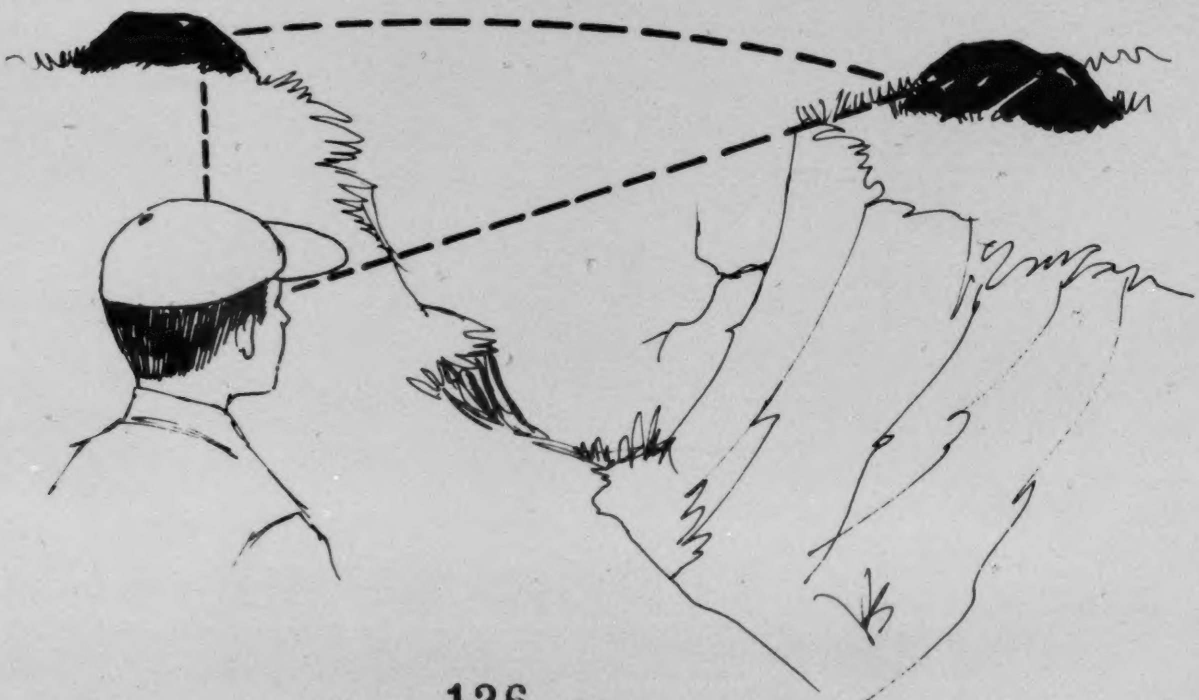
Measuring Inaccessible Distances (best used along creek)

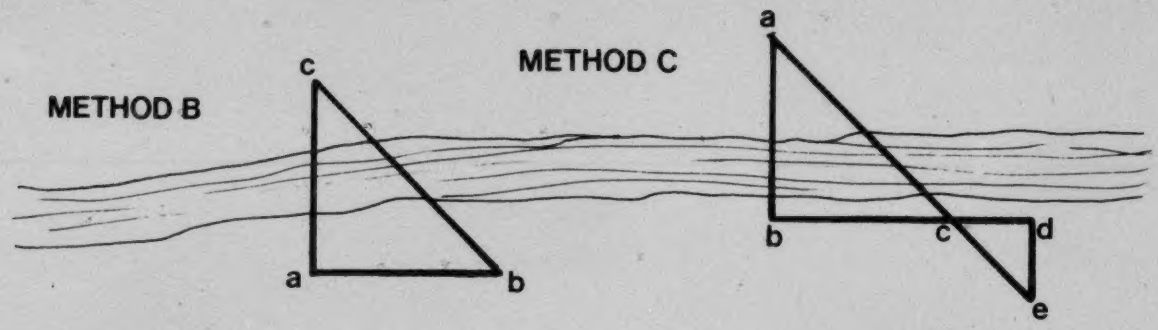
METHOD A NAPOLEON METHOD - least accurate but easiest

This method works because of the principle that all points are equal distance from the edge of a circle to the center of the circle.

The person who is using this method should have either a hat with a brim or a steady hand. First, sight an object on the other side of the "canyon" whose width you would like to measure. Use either your hand (like a brim of a hat would be) or the brim of a hat and make an imaginary line from your eyes to the edge of the brim of the hat to the point on the other side. WITHOUT moving your head up or down, move your whole body about 90 to 120 degrees until you can walk a straight line without falling in the canyon!! Place an imaginary X on the ground and measure the distance between you and the X to find the width of the canyon.

METHOD A





METHOD B - Triangulation using the Isosceles right triangle

Equipment

One compass or angle mirror (45 degrees), stake, knowledge of pacing or 30 meter tape, one student.

1. Locate the point from which you wish to measure and place a stake in the ground.

2. Sight a point B on the other side of the river. Walk perpendicular to the imaginary line made by points A and B.

3. Follow the perpendicular line until you are at a 45 degree angle from point B.

4. You have just made an isosceles right triangle.

5. Measure the length of line AC.

6. Since this is an isosceles right triangle, line AC is equal to line AB.

METHOD C - Establishing similar triangles

Equipment

Four stakes, compass.

1. Pick a point (A) on the other side of the "river" and place a stake on your side at point (B) exactly opposite point (A).

2. Walk perpendicular to the line AB for 30 paces and place a stake at (C).

3. Continue for 15 more paces along the same line and place another stake (D).

4. Make a new line perpendicular to BD and away from the "river". Follow this line until point E is reached. Point E is found when points A, C, and E are in a straight line.

5. You have just made a similar triangle. Since line BC is twice CD, then line AB is twice DE. All you need to do now is measure line DE.

METHOD D - Variation of Method C (establishing similar triangles)

There will be times when you will not be able to pace out the distance conveniently. On these occasions, the following method could be used. You are still working with the same principle of similar triangles.

To find the length of line AB, you construct a similar triangle in the method outlined in "Similar Triangles", but you make lines BC and CD any convenient length. Once you have measured lines BD and CD, you establish a point E and measure the line DE. To get the length of AB, you use the following proportion formula:

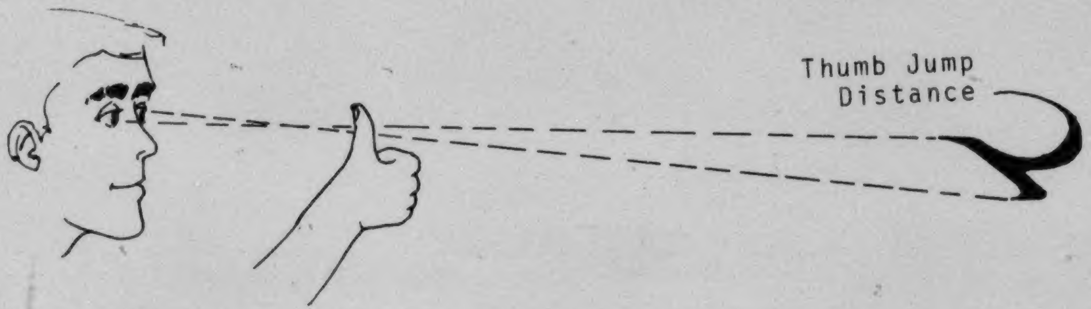
$$\frac{AB}{BC} = \frac{DE}{CD}$$

Example: BC = 50 M CD = 10 M DE = 5 M
What is AB?

$$\frac{AB}{50\ M} = \frac{5\ M}{10\ M} \qquad AB = 25\ M$$

METHOD E - Thumb-jump method

The thumb-jump method gives a quick estimation of a distance. The distance between your eyes is approximately 1/10 the distance to your thumb with your arm outstretched. Select a point (A) at the distance you wish to estimate. Hold your arm in front of you with the thumb pointing upward. Close the right eye and center your thumb on point A, using the left eye. Then close the left eye and open the right eye. Your thumb will appear to "jump". Estimate the distance (in feet), that your thumb appears to jump. You may have to blink your eyes several times to estimate the distance your thumb "jumps". Multiply the estimate distance of thumb jump by 10 to equal the estimated distance to point A.



ESTIMATING HEIGHT

AREAS USED

Large oak tree
Chimneys in Henry's Woods (former Girl Scout camp)
Trees along open field
Ledge along creek

OBJECTIVE

To learn how to estimate height of objects (trees, rock ledges, buildings), using methods not dependent upon conventional measurement techniques. Several of the methods involve geometric relationships.

PRE-ACTIVITY

1. Introduction to similar triangles.

2. Introduction to ratios and proportions.

ACTIVITY PROCEDURES

See following sheets. Suggest working in groups of two, if possible, i.e. a recorder and an experimenter. Reverse roles to check observations. Measure same object using several methods.

POST ACTIVITIES

Discuss ease of various methods used.

Discuss accuracy of methods used.

Compare data. How close are statistics using same method? How close are data using different methods?

METHOD A - Stick Method (Artist's method)

Equipment

One stick about 15cm long, two students

1. Have a person of known height stand next to the object being measured. His height is the unit of measurement to be used.

2. Back away from the object about 30 meters (or until you can clearly see the top of the object).

3. Hold the stick in your hand with your arm outstretched and sight along the top of the stick. Visually place the top of the stick at the same level as the head of the person next to the object. Place your thumb at the level you see his feet. Make sure your arm is parallel to the ground.

4. The height of the stick from your thumb to the top of the stick is one unit measurement and equal to the person's height you are sighting.

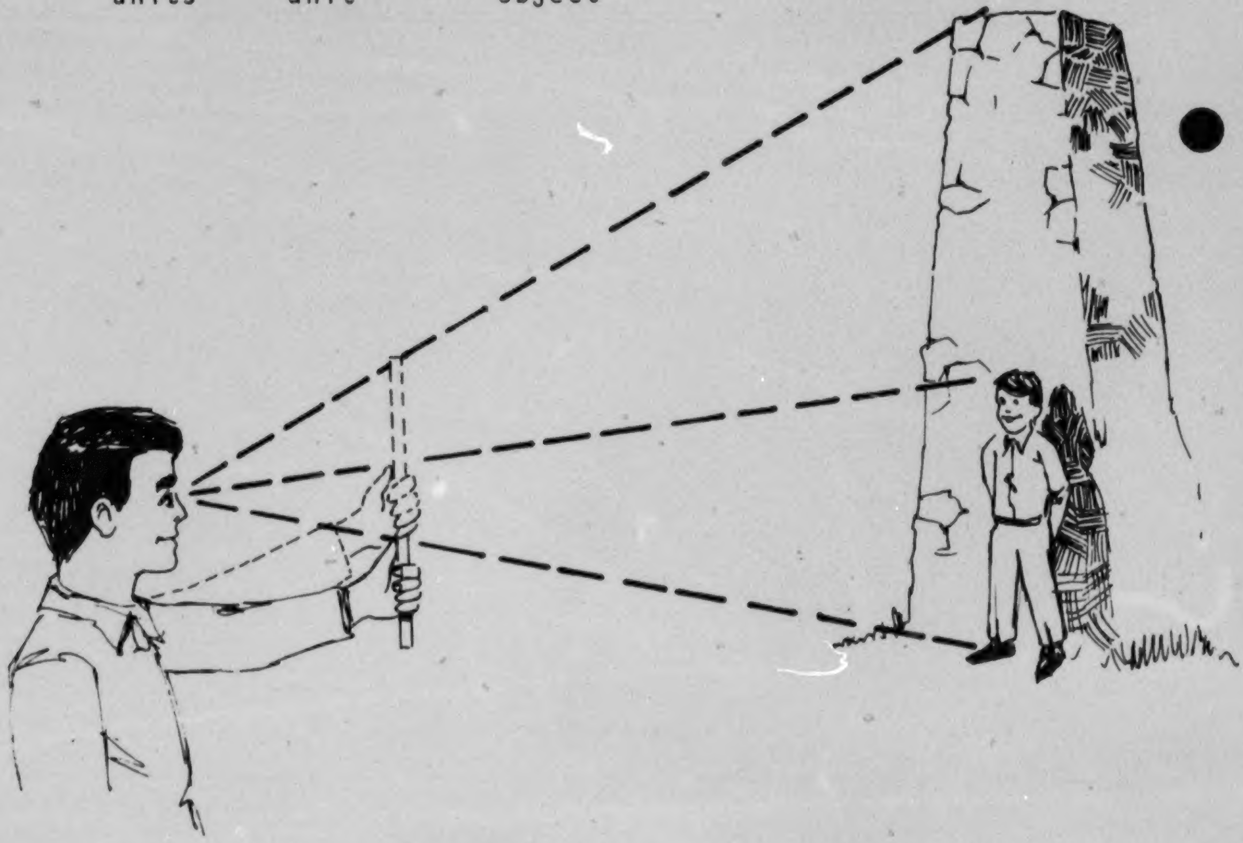
5. Move the stick upwards one unit at a time and measure the height of the object in terms of how many units height it is.

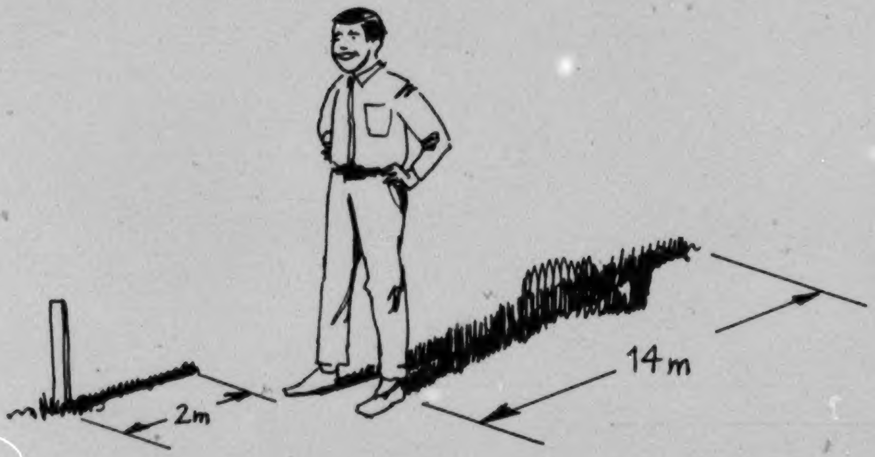
6. Multiply the number of units by the person's height to get the total height of the object.

Record of Observations

Each unit equals __A__ feet

______	X	__A__	=	______feet
No. of units		Length/ unit		Height of object





METHOD B - Shadow Ratio

Equipment

One yardstick, 30m tape or pacing knowledge, one student.

1. Place meter stick next to the object to be measured. Have it perpendicular to the ground.
2. Measure the length of the meter stick's shadow.
3. Measure the length of the object's shadow.
4. Solve the proportion.

Record of Observation

$$\frac{\text{Shadow of object}}{\text{Shadow of stick}} = \frac{\text{Height of object}}{\text{Stick's height}}$$

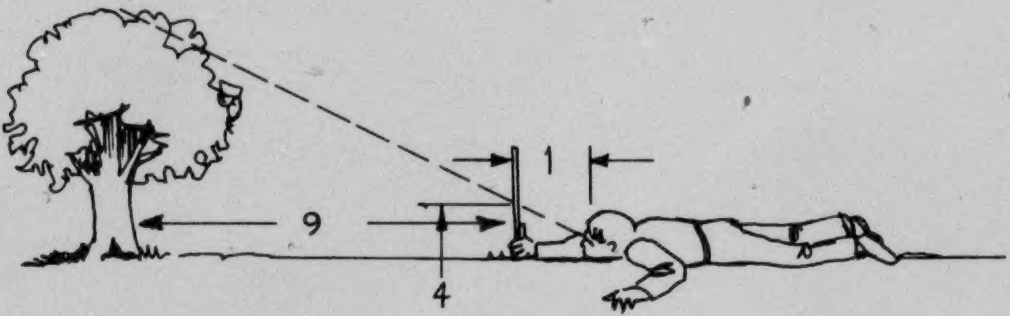
$$\frac{14M}{2M} = \frac{\text{Height of Object}}{1M}$$

METHOD C - 9-1 Method

Equipment

One meter stick, two students working together.

1. Start at the base of the object to be measured.
2. Walk nine (9) paces in a straight line away from the object.
3. Place the yardstick perpendicular to the ground.
4. Take one more pace (same size as first nine) along the same straight line.
5. Lie down on the ground and sight with lower eye to the top of the object. Have your eyes as close to the ground as possible.
6. The point where an imaginary line from the top of the object to your eye crosses the yardstick is the height of the object.
7. The height read on the meter stick is equal to the height of the object.   33 dm = 33 m



METHOD D - Merritt Hypsometer

Equipment

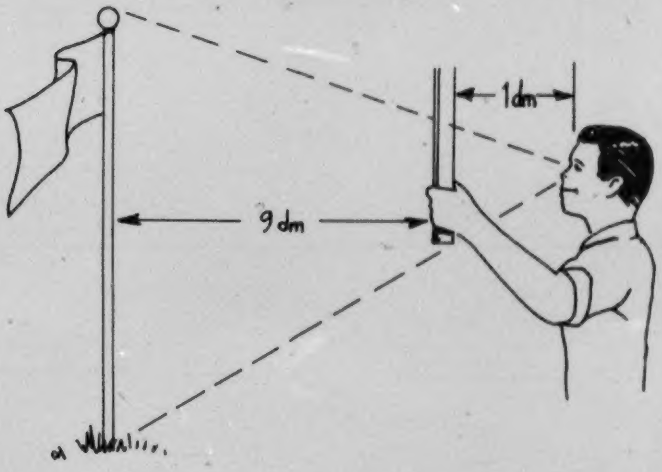
One meter stick, masking tape 1m long, marker, one student.

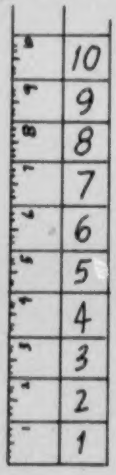
1. Construct a merritt hypsometer as shown.
2. Measure a distance from the base of the object (9dm).
3. Hold the hypsometer vertically 25 inches from your head.

4. Line the bottom of the hypsometer with the bottom of the object.

5. Holding your head very still, move your eyes up the length of the hypsometer until you see the top of the object being sighted.

6. Read the number you see on the hypsometer and that is the height of the object in dm. 1cm = 1 dm





METHOD E - Equal Sides Method

Equipment

One stick equal to the length of your outstretched arm, knowledge of pacing or a 30m tape, one student.

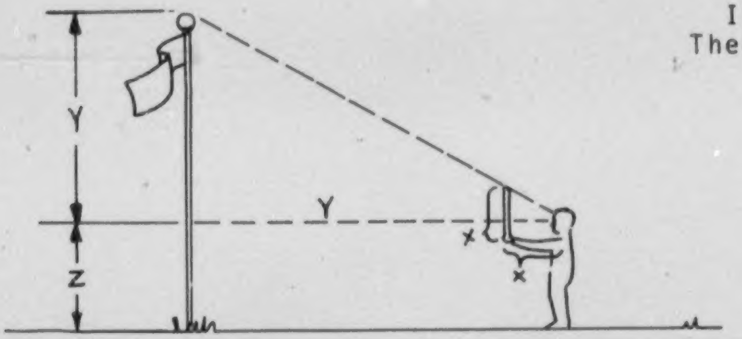
1. Select a stick the same length as your arm when it is stretched out in front of you.

2. Hold the stick at the bottom and perpendicular to your arm.

3. Back away from the object on level ground, sight along the top of the stick to the top of the object and along the top of your hand to the front of the object. Make sure your arm is parallel to the ground.

4. Walk backwards until there is formed an imaginary line from the top of the stick to the top of the object.

5. You are now the same distance from the object as the object is high. Measure or pace the distance to the object, and that will be the height of the object. DO NOT FORGET TO ADD YOUR HEIGHT FROM YOUR EYES TO THE GROUND TO THE DISTANCE FOR THE TOTAL HEIGHT.



If X = X
Then Y = Y
Z = Your Height

METHOD F - Isosceles Right Triangle Method

Equipment

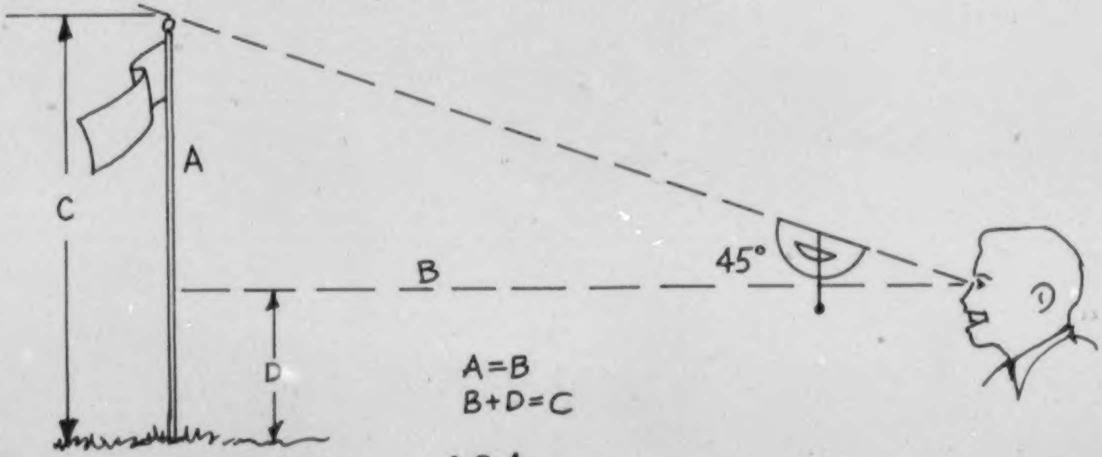
One clinometer (a clinometer may be made by holding a protractor upside down and tying a weighted string to the pivot point), one student, level ground.

1. Hold the clinometer at eye level.

2. Back away from the object until the top of the object is at a 45 degree angle from a horizontal line from your eye to the object.

3. You have just made an isosceles right triangle.

4. The distance from the object to you is the same as the height of the object plus your height from your eyes to the ground.



ESTIMATING DIAMETERS

AREAS USED

Large Oak Tree

Open areas of Henry's Woods

OBJECTIVE

To estimate the diameter of cylindrical object by using non-conventional methods.

PRE-ACTIVITY

1. Develop understanding of relationship between diameter and circumference.
2. Construction of diameter tapes and/or biltmore stick.
3. Discuss merchantable height of tree.

ACTIVITY PROCEDURES

See following sheets.

POST ACTIVITY

Discuss and compare data from two methods. Which is easier? quicker? more accurate?

Estimate board foot volume.

Graph sizes of trees in defined area.

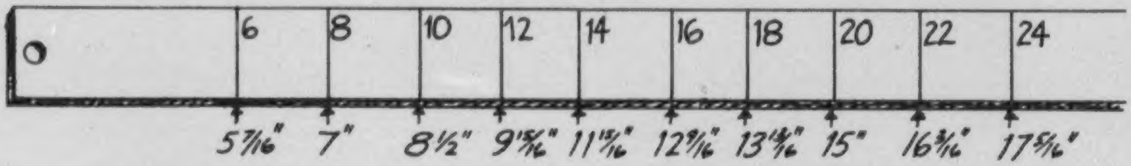
THE BILTMORE STICK

Equipment

One yardstick, masking tape, marker, one student.

Construction of the Biltmore Stick

1. Place a strip of masking tape along the yardstick.
2. Mark as shown in the drawing from 6 to 24 inches.



135

How to use the Biltmore Stick

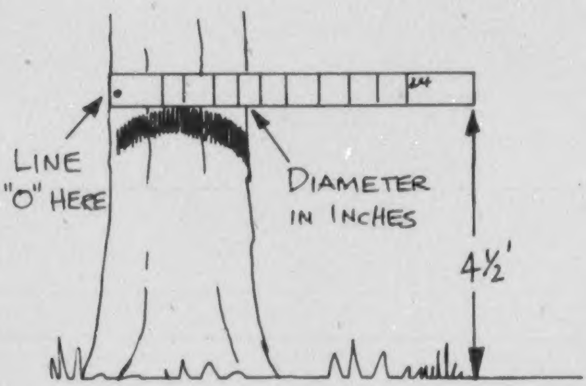
1. Hold the stick perpendicular to the tree at the Diameter Breast Height. DBH = 4 1/2 feet high

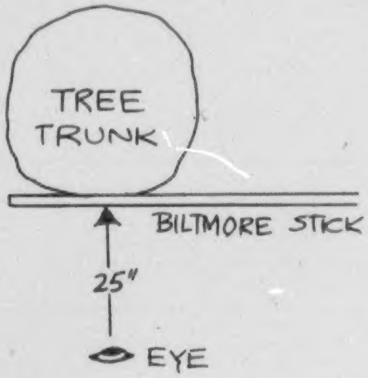
2. Hold the stick against the tree and 25 inches from your eye.

3. Line the 0 end of the stick even with the outside edge of the tree. HOLD YOUR HEAD STEADY!

4. Without moving your head, look at the line on the Biltmore Stick that lines up with the other outside edge of the tree.

5. The number is the diameter of the tree in inches.





THE DIAMETER TAPE

Equipment

Tape-like material or two pieces of masking tape, marker, yardstick, one student.

Construction

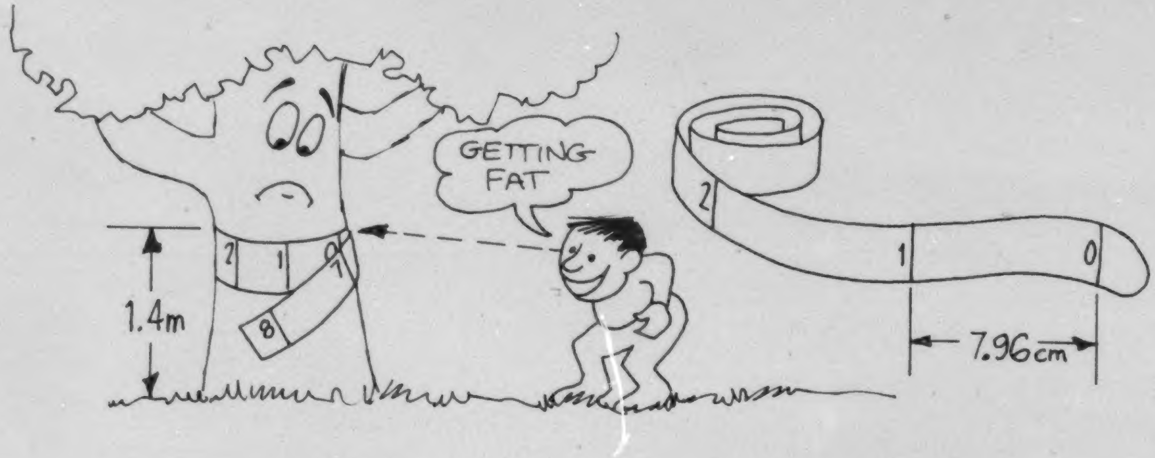
1. Mark the tape off in 7.96cm sections.

2. Number each section.

How to use

1. Wrap the tape around the tree at about 1.4m from the ground. Read the number in inches to get the diameter.

   Note - The sections are measured in 7.96cm lengths because a stick 1cm in diameter has a circumference of 3 1/7cm.



Merchantable Height of a Tree

The merchantable height of a tree is the height of a tree that can be made into lumber. This height is from the base of the tree to the point where the tree is eight inches in diameter. You may use any of the methods described earlier in the manual to determine the height of a tree; but, instead of measuring from the tip of the tree, measure from the point where the tree is eight inches in diameter.

Estimating Board Foot Volume

One board foot is equal to a piece of lumber 1" thick by 12" wide and 12" long. To estimate the board feet of a standing tree, you can use the following table.

Instructions for the Table (p132)

Find the diameter and the merchantable height of the tree. In the left-hand column, locate the diameter (DBH). Along the top, find the number of 16-foot logs in the tree's height. Where the long column and the diameter row meet is the board foot volume of the tree.

(Board Foot Volume Table)

D.B.H. Inches	Height of Merchantable Tree in No. of 16 Ft. Logs						
	1½	2	3	4	5	6	7	8
12	62	80	133	183	235	286		
14	64	88	147	210	274	338		
16	67	96	163	242	320	399		
18	71	109	190	280	370	459	550	701
20	75	123	221	330	435	543	651	758
22			258	383	509	633	760	884
24				438	584	728	882	1035
26					666	832	1013	1190
28					750	941	1114	1346
30					850	1062	1291	1518
32						1195	1449	1700
34						1333	1614	1898
36						1494	1782	2095
38							1955	2305
40							2150	2523

Record of Observations

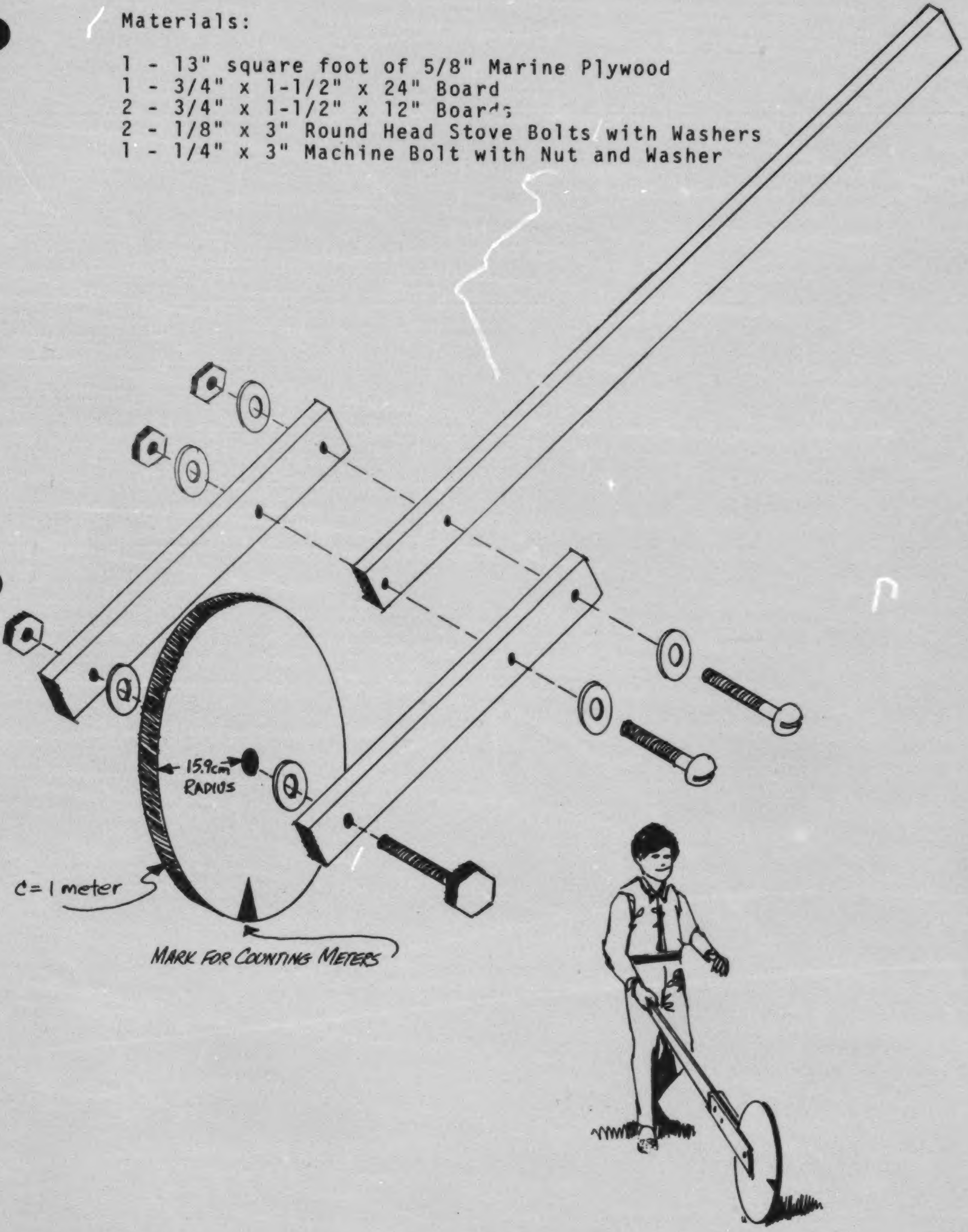
Diameter of the tree (DBH) ________ Merchantable Height ________

Number of 16 foot sections ________ Number of board foot volume ________

MEASURING WHEEL

Materials:

1 - 13" square foot of 5/8" Marine Plywood
1 - 3/4" x 1-1/2" x 24" Board
2 - 3/4" x 1-1/2" x 12" Boards
2 - 1/8" x 3" Round Head Stove Bolts with Washers
1 - 1/4" x 3" Machine Bolt with Nut and Washer


15.9cm RADIUS
C=1 meter
MARK FOR COUNTING METERS

Math·Steam Flow

Marlin W. Klinger
Grades 10 through 12

CONCEPTUAL THEME

Stream volume of flow

OBJECTIVE

Upon completion of this activity, students will be able to determine the stream volume of flow in liters per day (24 hours) at one of two specified sections of the Bushkill stream.

Equipment and Materials

Tape measure, meterstick, watch with sweep second hand, small floatable object (cork, piece of dead branch or stick), measuring wheel, compass, 100 ft. tape.

PRE-ACTIVITIES

Some review of the metric system, possibly some exercises concerning the use of the metric system.

ACTIVITY PROCEDURES

1. Select one of two sites that have been marked for stream flow study, one site is relatively slow moving water, the other site is more rapid flowing. Both sites are adjacent to the former Girl Scout Camp. Both sites have been marked. Both sites have relatively rocky bottoms, and are readily accessible. Films are available on both sites.

2. Determine the length (L), average width (W), and average depth (D) of that section of stream which has been selected. Express length, width, and depth to nearest centimeter (cm). Example 5.3m = 530 cm (L), 3.1m = 310 cm (W), .5m = 50 cm (D).

   A. Length (L) = __________cm

   B. Width (W)

   W_1 _______cm (width at upstream end of test section).
   W_2 _______cm (width at midpoint of test section).
   W_3 _______cm (width at downstream end of test section).

   _______cm Total (W_T)

   Average Width = W_A = __________cm

NOTE: Stream width can also be determined by Triangulation.

A. Triangulation using the Isoscles Right Traingle:

(1) Locate the point from which you wish to measure and place a stake in the ground.

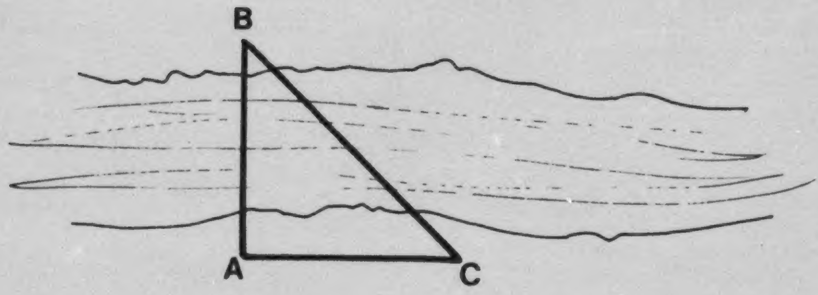
(2) Sight a point B on the other side of the stream. Walk perpendicular to the imaginary line made by points A or B.

(3) Follow the perpendicular line until you are at a 45 degree angle from point B.

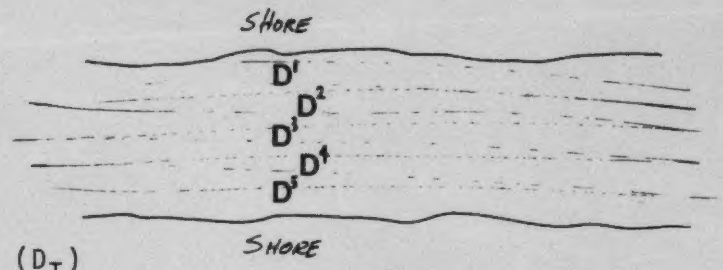
(4) You have just made an isosceles right traingle.

(5) Measure the length of line A C.

(6) Since this is an isosceles right traingle, line A C is equal to line A B.



C. Depth (D)



D_1__________cm
D_2__________cm
D_3__________cm
D_4__________cm
D_5__________cm
__________Total (D_T)

Average Depth = D_A = __________cm

3. Determine volume of water in test section by multiplying (L) x (W) x (D):

________ x ________ x ________ = _________cubic centimeters

4. Convert amount in Part 3 above to liters using the following conversion factor: 1000 cubic centimeters = liter, 1 cm^3 = 1 liter

Volume (V) = ________cm^3 = _________liters

5. Using a watch with a second hand and a small floatable object (a cork, or piece of dead branch), determine the average number of seconds (T) required for the volume of water to flow through the test section (in other words, the number of seconds which the cork takes to float from one end of the test section to the other end of the test section).

T_1 _______seconds
T_2 _______seconds
T_3 _______seconds

T_T _______Total Seconds

T_A _______Average Seconds

6. If _______liters (Part 4 above) take _________seconds (Part 5 above) to flow through the test section, how many liters flow downstream in one second period of time:

$$\text{Volume of Flow} = V_F\ (\text{sec.}) = \frac{\text{Volume (V) in liters}}{\text{Time (T) in seconds}}$$

$$= \frac{(\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)}{(\qquad\qquad\qquad)}$$

= _______________liters/second

7. Convert the above figure in liters/second to each of the following in a series of steps.

A. V_F (liters/minute)-liters/second x 60 sec/minute

V_F (1/min) = __________

B. V_F (liters/hour) - liters.minute x 60 min/hour

V_F (1/hr) = __________

C. V_F (liters/day) - liters/hour x 24 hours/day

V_F (1/day) = __________

POST ACTIVITIES

Determine what portion of your school and/or community could be supplied by this quantity of water (assume a per capita use of 560 liters per person per day).

1. Portion of school supplied by this amount _______.
2. Portion of your community supplied by this amount ___________.

OTHER CURRICULUM AREAS

Science

An activity showing the type of sediment moved and deposited by a slow moving stream.

This study could also fit into the overall study of a stream.

A study could be made on the adaptations of organisms living in fast-flowing water compared to slow-moving water.

History

Some discussion could be made of changes in volume of flow which has occured during recent times compared to the past. (Relate to flood plain, volume of flow had apparently been higher in the past.)

SCIENCE

Science

Ingrid Simke - Science

INTRODUCTION TO SCIENCE MODULES

This series of science curriculum modules is the initial part of a continuous program in environmental education specifically designed for utilization at Jacobsburg State Park for levels 5 through 10. Teachers can directly implement these modules into their existing science curriculum or they can be used as additional source guides. It is not, however, to be considered as the sole means by which an environmental educational program can be developed within a school.

The modules or guides are flexible and teachers can add or delete material to coincide with their individual preferences and scientific background. It is, of course, the teachers' responsibility to use the modules and outdoor sites in harmony with their curriculum and indoor classroom studies.

The modules are designed for all students regardless of diversities in abilities and interests. The modifications of the modules to fit the various needs of a special group will be made by the teacher.

Teachers using the modules may need to use supplementary sources. Films, filmstrips, tape cassettes, graphs, charts and maps can and should be collected. Resource people from the community can be valuable aids.

The outdoor sites at Jacobsburg were selected according to their unlimited possibilities for environmental educational learning experiences. The entire area, however, represents an outdoor laboratory where scientific principles and concepts are learned through discovery, inquiry, investigation and exploration.

OBJECTIVES

By observing, classifying, measuring, analyzing, and interpreting phenomena at Jacobsburg State Park, the student will demonstrate an understanding of the following concepts:

1. All living things are interdependent with one another and with their environment.

2. Man depends primarily on renewable natural resources for survival. His use and care of them in accord with ecological principles determine his own fate.

3. Organisms are products of their environment and heredity.

4. Organisms and environment are in constant change.

Activity 1
Site #1 - #9

CONCEPTUAL THEME

The physical and biological characteristics of an area are shaped by geological processes and man's activities.

OBJECTIVES

Upon completion of this activity, students will be able to:

1. Identify the physical features of the area which have been shaped by the geological history of the region.
2. Identify the physical features of the area which have been shaped and altered by man's activities.
3. Relate the presence of living things to the presence of abiotic, nonliving characteristics of the area.

Equipment and Materials

Pen or pencil

PRE-ACTIVITIES

Devinition of terms:

Metamorphosis
Abiotic
Velocity
Discharge
Meltwater
Millrace
Carrying Capacity
Erosion

Site Description and Geological Background of the Stream Trail

Site 2 The beginning of the hemlock stand.
Slide 2

1. What conditions must have existed to enable the hemlocks to reach their present size?

   Ans. Hemlocks need light, moisture, and a rich organic mat in order to thrive. At one time, this area must have been an open, well-lit area. In addition, optimum moisture conditions were available from the stream.

Slide 2

2. Why is there a relative lack of plants growing beneath the hemlock stand?

   Ans. The dense canopy formed by the hemlocks shade the ground and prevent all but the shade-tolerant forms from growing. Also, this area has been subjected to heavy use by humans which has compacted the soil and trampled plants forming the ground cover.

Site 4 Hemlock stand - island in creek. Notice the very
Slide 2A broad flat ground on this side of the creek (northeast) on which you are standing.

3. How did this flat area develop?

   Ans. This is an old flood plain which formed as a result of the meltwater of glaciers approximately 100-150 thousand year ago. Look at the other side of the creek (northeast). You will notice the very steep slope. This had formed the valley wall of the stream some 100,000 years ago as it does now.

4. Where is the valley wall on this side of the creek (southwest)?

   Ans. It lies off to the left some several hundred feet. This had apparently been a very wide stream a long time ago. The old stream was located between these valley walls. There is a small island located on this side of the creek. See if you can find it.

Slide 2A

5. How do you suppose this island formed?

Ans. This island had been part of the old flood plain and has been separated from it due to the action of water.

Slide 2A

6. How would you prove that the island had been part of the flood plain?

Ans. Dig a pit on the island and the flood plain (one foot square) and compare the layers in the two pits at the same level.

Slide 2A

7. Do you think the island gets flooded over regularly during some time of the year?

Ans. It would seem it does - there are no trees or tree seedlings growing on this island. They do not tolerate an overabundance of moisture. One can also find debris - twigs, etc., which have been deposited by water.

As you move along to Site 3, you will notice the bedrock outcrop on the opposite side of the creek and the point bar on the near side.

Site 5 Outcrop
Slide 3

8. What evidence can you find that the stream had been at a much higher level at some time in the past?

Ans. The rounded indentations (solution pits) on the outcrop formed by the action of water. The cobbles and stones located on recessed shelves. These had most likely been deposited by the stream when it had been at a much higher level.

Site 5
Slide 3

9. What kind of rock is this bedrock outcrop made of?

Ans. Shaley-slate. Shale changes into slate under extreme heat and pressure (metamorphosizes). It has not undergone complete metamorphosis.

Slide 3A

10. Look at the rocks in the stream. Are they made out of the same kind of rock as the bedrock?

Ans. There are some pieces of shaley-slate, but many of the rocks in the streambed are made of a different kind of rock material predominantly quartz sandstones.

Slide 3A

11. How did these rocks of different materials get there?

Ans. The stream brought them down at a time when it was flowing at a much greater velocity and discharge and the large boulders (goonies) have been carried by the meltwater of glaciers.

Slide 3A

12. Compare rocks in the streambed with rocks located in the forest. How do the two location of rocks differ and how are they the same?

Ans. Some are made of the same kind of material in both locations but those in the stream are much more rounded.

Slide 3A

13. Why are the rocks found in the stream more rounded than those found on the forest floor?

Ans. Water is an important erosion factor to break down and round off rock. The flow of water does this directly or through the action of chemicals dissolved in the water or sediment carried in the water.

Slide 3B

Examine the point bar on this side of the creek.

14. What size rock material is it composed of?

Ans. Rocks, pebbles, sand and mud

Slide 3B

15. How did this bar form?

Ans. The material was deposited by the stream. Streams deposit on the inside of a bend and erode on the outside of a bend. Also, it is formed by material carried by the surface runoff.

Slide 4

16. Why doesn't the stream flow in a straight channel? Why does it meander?

Ans. Water takes the path of least resistance and steepest gradient and will erode through material which is easiest to move.

Slide 4

17. Does the water move at the same speed along the entire length of the creek?

Ans. No

Slide 4

18. How can you visually tell where the water is flowing faster or slower?

Ans. Where riffles occur, the water if flowing faster - areas where the water surface is flat or areas of greater depth, the water is flowing more slowly.

Slide 4

19. Why does the water velocity change along the creek?

Ans. Changes in elevation of the streambed. The steeper the slope, the faster the flow. The narrower the width of the stream channel, the faster the flow. The deeper the stream channel or the wider the stream, the slower the velocity. It should be pointed out that the volume of flow (discharge) is the same along the stream.

Slide 4A

20. How does the bottom composition differ in the riffles compared with pools?

Ans. Riffles are rocky. Pools are predominantly mud or sand.

Slide 4A

21. Why does the bottom composition differ in these two areas?

Ans. In regions of riffles, the faster moving water carries away the light sand and mud particles leaving behind the heavier rocks and stones. In pools, the mud and sand particles settle out because the water velocity is slower and does not have the energy (carrying capacity) to move even small particles such as sand and mud and so, these particles settle out as the velocity of water slows down.

As you move along to Site 6, notice the change in elevation on both sides of the creek.

22. How do you explain this change in elevation?

Ans. The wall on the other side of the creek to the west away from the present stream channel and the stream are flowing along the wall on this side of the creek.

Look around you.

23. What else is changing at this site?

Ans. Forest composition. Trees are changing from evergreen to non-evergreen.

24. Why has this change taken place?

Ans. Change in conditions of light, soil, moisture are or were no longer favorable to the hemlock growth.

As we approach Site 6 the change in elevation on this side of the creek becomes more apparent. You are walking on top of the old valley wall. Stop at Indian Cave Outlook. Back in the 1920's and before, there had existed a large mill pond in this region. The depth of the mill pond was about 12 feet deep. The island you see had projected out of the pond with an abundant growth of large willow trees. In order for it to have projected out of the mill pond, its elevation at that time must have been higher.

Dam

28. How do you explain this reversal of flow? Before you answer this question, follow the mill race up and down and see if you can discover the answer.

    Ans. A spring fed tributary flows into the mill race. The water is diverted in two directions. Some of it flows down the millrace towards the gun factory and some of the water entering the millrace flows back towards the creek.

29. Why has this diversion of water taken place?

    Ans. The tributary stream entering the millrace has carried sediments with it. This has accumulated over the years and has raised the level of the bottom of the millrace. The result of this deposition is the creation of downward slope to the creek and a downward slope to the gun factory.

Find the point where the millrace and creek join.

30. What kind of a deposit do you notice in this area?

    Ans. Clay - yellowish gray.

31. What is the origin of this deposit?

    Ans. If you examine the soil horizon in this area which is exposed at this point, you will notice the clay layer lies about three to four feet below the surface of the soil. This clay has most likely been deposited by the action of glaciers.

Return to the trail leading to the dam site. For approximately 100 years, a dam extended across the creek at this point. Go down to the stream bed and examine the exposed remains of the dam.

32. How does the clay containing material here compare with the clay deposit found at the point of union of the mill race with the creek?

    Ans. The clay at the dam is reddish and not confined to one layer. The clay deposit at the millrace-creek union is yellowish gray and more or less confined to one zone.

25. What may have happened between the 1920's and the present to decrease the elevation of the island to its present elevation?

Ans. The breaking of the dam in 1936 was a major erosion factor. This, followed by subsequent flooding in later years and the erosion action of the stream along the sides of the island, have all contributed to the decrease in elevation of the island. The island had, at one time, presumably been part of the mainland on the northeast opossite side of the creek. The stream had eroded through on the northeast side of the island and separated it from the mainland. An old stream channel, partially filled with water, is located on the northeast side of the island. During times of highwater, the stream most likely courses through this old channel.

26. Do you feel the island at its pre-1926 level had been composed of bedrock or softer materials. Why?

Ans. If it had been composed of bedrock, it would not have eroded down to its present level in the short period of time of fifty years since the dam broke.

Follow the trail until you reach the marker, indicating the dam trail. Follow along the dam trail. You will have to cross the mill race. The mill race is Site 8 .

Site 8
Slide 7

27. For what purpose was the mill race built?

Ans. To provide water power for the activities at the gun factory. The creek was dammed creating a pond. As the water rose in the pond, pressure was increased. Water flowed into and through the mill race to the gun factory as a result.

Notice that water is flowing not from the creek into the mill race but from the mill race into the creek!

33. Where did the clay at the dam come from?

Ans. It was used to make the dam impervious to water. In addition, parts of the mill race were lined with clay.

Return to the mill race. Follow the markers to the pool located to the right of the race. This is Site 10

Site 10
Slide 9

34. Is this a man made pool or is it a natural pool? What made you decide?

Ans. The pool is man made - look at the exposed bedrock. It has been cut even by tools. An attempt had been made to quarry the bedrock for a source of slate but had to be abandoned. Either the slate was not of a useful quality (metamorphosis was incomplete) or the water table was too high to permit ease in removal of the slate.

Slide 9

35. How does the vegetation in the pool compare with the vegetation in the creek?

Ans. The pickeral weed and the lily pads are typical ponds and lakes which are standing bodies of water. This type of vegetation is not found in streams or other bodies of moving water.

Many questions may have been raised in your mind that may not have been brought out in this activity sheet. Jot a few of them down for later discussion.

Perhaps you noticed things along the trail that you feel should have been discussed. List them below.

FOLLOW UP ACTIVITIES

Discuss answers of students.

Give correct answers.

Discuss questions raised by students

OTHER CURRICULUM AREAS

Math

Measure changes in elevation along trail.

Measure height of trees.

Figure out how many people the stream could support in accordance with stream velocity given the amount of water needed per family.

Art

Photograph sites, draw aesthetic areas along trail.

Draw a landscape of what it would have looked like at the time.

Science

Identify trees at different sites.

Take soil samples and chemical analysis.

Take light reading at different sites.

Collect rock samples from different sites and compare.

Language Art

Write a descriptive paragraph of a site.

Act out the different parts of the stream or area of land. Is it flowing, twisting, bending? Is it rigid and fast? Feel the stream.

History

Read about the history of Jacobsburg and the Gun Factory.

Make a model of the old stream and rock formations.

Activity 2
Comparing Plots of Ground in a Forest
Site 1 - 9 or school site

OBJECTIVE

To observe the conditions which promote animal and plant growth in the forest.

Equipment and Materials

String, Meter stick, Clipboard

ACTIVITY PROCEDURES

1. Select an area which is covered with forest litter - leaves, twigs, etc.
2. Mark off one square meter and bound it with string.
3. Gently remove the top layer of leaves, gradually working your way to the soil.
4. Observe the differences in composition of the litter.
5. Record the evidences of life - number of worm holes, worm casings, decayed matter and insects.
6. Repeat procedures 2-5 except this time select a well traveled path or sandy area devoid of leaves.

Compare both areas and explain differences in observations.

	Plot 1	Plot 2
Worm Holes Present		
Worm Casings Present		
Insects Present		
Organic Decomposition Evident		
Soil Condition (loose or compact)		

CONCLUSIONS

1. Does the forest litter contribute to favorable growth conditions for animals and plants? Explain.

2. In what other ways does forest litter contribute to conservation of natural resources?

   A.

   B.

OTHER CURRICULUM AREAS

Math

Included in module.

Art

Draw a worm and its burrow.

Science

Run a percolation test in each area. Compare differences. Collect soil samples. Set up a Berlese Funnel - Compare organisms into two soil samples.

Language Art

Have students write a composition about how it feels to be a worm in each of the two areas.

Nature

Try and raise worms in a wormery.

Activity 3
Stream Survey - Physical Characteristics
Site 3 or any stream

CONCEPTUAL THEME

The physical features of a stream can be measured. Each characteristic contributes to the type and diversity of life which the stream can support.

OBJECTIVES

Upon completion of this activity, students will be able to:

1. Identify physical features of a stream by observing and measuring directly the type of bottom, water and air temperatures, velocity of flow, volume of flow, cross-sectional profile and average depth.
2. Identify different habitats within the stream which will support aquatic life of diversified needs.

Equipment and Materials

Ball of string
Plastic sandwich bags
Meter Stick
Thermometer
Orange
Cork and small plastic bottle
Watch with second hand

PRE-ACTIVITIES

Discussion of the difference between velocity and volume of flow (discharge).

Discussion of bottom composition possibly encountered; mud, sand, gravel, cobbles, bedrock, boulders. Elicit from the students what features can be considered physical characteristics.

METHOD OR PROCEDURE DISCUSSION (Prior to field trip and in the field.

1. In what area or position of the stream should the water temperature be taken?

   Ans. Surface temperature, stream bottom, between surface and bottom, riffle temperature, pool temperature and in sun and shade.

2. Where should the air temperature be measured?

   Ans. Above the stream surface where it is shaded by trees and where the stream surface is exposed to the direct rays of the sun. Measure right above stream surface and one meter above stream surface.

3. How can you measure the velocity of the water? Should it be measured at the surface, bottom or between the bottom and surface of the stream? In riffle or pool?

   Ans. The general procedure for measuring velocity is to stand in the middle of the stream and stretch out a pre-measured piece of string (ex. 5 meters) between two people, one of whom is standing upstream, the other standing downstream. The person standing upstream releases a floating object and records the length of time it takes to travel the length of the measured string. Then using the formula, length divided by time, obtains the velocity.

   $$V = \frac{L}{T} \quad \text{meters/second}$$

   The procedure should be repeated three times and an average obtained. This will give you the velocity of the water at the surface of the stream. The velocity between the surface and bottom should be measured also, as well as the velocity of the water at the bottom of the stream. In order to obtain the velocity below the surface, use an orange or a plastic bottle weighted with enough sand to enable it to remain suspended between the surface and the bottom. Add additional sand to the plastic bottle to keep it suspended right above the stream bottom in order to measure the velocity at the stream bottom. Again repeat the procedure three times. Obtain a final average of velocity using data from surface, bottom, and between surface and bottom velocities. An average velocity should be obtained for riffles and separately for pools.

4. What does volume of flow mean and how is it measured?

Ans. Volume of flow means the amount of water flowing past a given point of the stream at a given time. It is usually expressed in cubic meters per second.

The formula is: $R = WDaV$

R = volume of flow in cubic meters per second
W = average width of stream in meters
D = average depth in feet
a = constant factor for bottom type
  riffles = .9
  pool = .8
V = velocity (obtained from above activities and expressed in meters per second)

To obtain D (average depth in meters of the stream), suspend a string across the width of the stream and tie the ends securely at each side. Measure the depth of the water at intervals of 50 centimeters. Average the data obtained. Also note bottom composition.

To obtain W (average width of the stream), measure the width of the stream in three seconds and average data together.

The volume of flow should be computed for both a riffle section and a pool section.

The constant (a) is determined by the bottom composition for which the volume of flow is computed.

5. What is a cross-sectional profile? How is it made and what significance is it?

Ans. A profile is a map of the width of the stream showing variations in depth and bottom composition across that width. A profile should be made of the same pool and riffle area where temperature, volume of flow and velocity determination were made. Suspend a string across the width of the stream and tie the ends securely. Measure the depth of the water at intervals of 50 centimeters. Record the bottom type on a profile map and where possible, collect a small sample of the bottom composition at each interval which is placed into the plastic bags and labeled. The label should include the depth interval at which it was located.

Data Sheet Stream Survey
Physical Characteristics

		Pool	Riffle
Water Temperature			
Shady Area			
	Stream Surface	______	______
	Stream Bottom	______	______
	Between Surface and Bottom	______	______
Sunny Area			
	Stream Surface	______	______
	Stream Bottom	______	______
	Between Surface and Bottom	______	______
Air Temperature			
Shady Area			
	Stream Surface	______	______
	One Meter Above	______	______
Sunny Area			
	Stream Surface	______	______
	One Meter Above	______	______

Velocity

Riffles			
	Surface	______	
	Between Surface and Bottom	______	
	Bottom	______	______Average
Pool			
	Surface	______	
	Bottom and Surface	______	
	Bottom	______	______ Average

Volume of Flow

Riffle ______

Pool ______

QUESTIONS

1. How did the temperature vary between pool and riffles? How do you explain this difference?

   Ans. Temperature is cooler in riffles due to greater evaporation.

2. How did the temperature vary between shady and sunny areas?

   Ans. Cooler in shady areas as sunlight is not available as a heating source.

3. What effect would the removal of vegetation shading the stream have on the overall temperature of the stream?

   Ans. It would cause an increase in temperature.

   What effect would this have on the population of organisms which require cool water?

   Ans. It would deplete this population.

4. How did the velocities compare between pools and riffles?

   Ans. It was greater in riffles.

   What explanation can you offer for the change in velocity of the stream?

   Ans. Obstructions, dams, etc.

5. How did the volume of flow compare in pools and riffles?

   Ans. Same, it just travels at different velocities.

OTHER CURRICULUM AREAS

Art

Build a waterproof case for a camera and take pictures underwater of pool and riffle habitats.

Science

Collect organisms from pools and riffles - compare characteristics.

Compare the number of different types (diversity) of organisms in pool and riffles.

Determine the food web of pools.

Determine the food web of riffles.

Language Art

Research on types of pollutants discharged into waterways and their effects on aquatic communities. Have students do reports.

Nature

Determine how different organisms obtain their food.

Make models of organisms.

Activity 4
Succession on Bare Rocks
Site 3 or school site

Teacher Reference - P. 114-6 "People and Their Environment, Outdoor Laboratory?

OBJECTIVE

To understand how plant life on bare rock undergoes a series of changes and how ultimately a forest or other climax community may grow where there was once only bare rock.

Equipment and Materials

Hand lenses

ACTIVITY PROCEDURES

On this trip, you will be taken to an area composed chiefly of rocks, showing both bare rock and those supporting plant growth. Examine the area looking for bare rock, potholes of soil, cracks, and crevices, and a variety of plants (lichens, trees). Try to account for these wide differences.

Study each different area, listing plants, soil, moisture, temperature, etc.

OBSERVATIONS

1. Bare rock

   A. What do you find growing on rocks?
   Ans. Possibly, lichens.

   B. How do these organisms obtain their nutrients?
   Ans. Lichens - Algae in lichens make food for fungus in lichen.

   C. How do these organisms help to break down the rocks to form soil?
   Ans. Lichens secrete an acid which breaks down or weathers the rocks. Roots force their way into crevices and cracked rock.

2. Small shallow bowl of soil in the rock

   A. What do you find growing here?
   Ans. Possibly mosses, ferns and plants.

   B. Why are they able to survive?
   Ans. Shallow root system, gets nutrients out of soil, low growing.

   C. What can you observe about the amount of soil, available water, and growing ability?
   Ans. The more soil, the more water holding capacity generally and the bigger the growing ability.

3. Large potholes of soil or large crevices filled with soil.

   A. Relate the size of the plants to the amount of soil.
   Ans. More soil - bigger plants.

   B. What organisms do you find?
   Ans. Insects, tiny worms.

4. Area covered with shallow soil.

   A. Do you find shrubs and small trees here?
   Ans. Usually

5. Area covered with soil to a considerable depth.

   A. Here you find a flourishing forest. Why?
      Ans. Soil is deep enough to support growth of large tree which has a deep root system.

6. Area developed by wind or water erosion.

   A. What evidence did you find of either wind and/or water eroding the rocks.
      Ans. Example - pits in rock, smooth rock, discolored rock, bits or pieces of rock at base of rock.

CONCLUSIONS - FOLLOW UP

1. How long do you think that it will require nature to form soil from the rocks.

   Ans. A very long time.

2. How is soil being formed on bare rocks?

   Ans. Rock broken down by wind, water, erosion, chemical erosion and breakdown by plant roots and chemicals. Accumulation of dead organic material.

3. What aids in the formation of crevices in the rock surfaces?

   Ans. Repeated freezing and thawing of water, root penetration, chemicals from roots.

4. Compare the size of the different plants found in the various stages in the succession.

   Ans. Early or pioneer stages - small plants medium size - large.

5. What increases the water-holding capacity of soil?

   Ans. Amount of dead organic material, number of organisms living in soil and increasing pore space.

6. When might you expect animals to begin to inhabit this area?

   Ans. When adequate food and shelter is available.

7. How is succession on bare rocks of benefit to wildlife?

   Ans. It eventually provides a suitable habitat.

8. What is a Climax Community?

   Ans. The "last" stage in succession - long lived, stable

9. Will the climax always remain stable?

   Ans. If conditions remain the same without interference from man or a natural catastrophe.

10. Student comments and questions

OTHER CURRICULUM AREAS

Math

Measure height of different plants.

Art

Draw or photograph different plants.

Science

Measure water holding capacity of soil pockets of different size.

Collect soil samples - Set up Berlese funnel, compare organisms found in different soil pockets.

Nature

Collect and preserve examples of different types of plants.

History

This study can be related to the way a new volcanic island develops into a plush tropical island.

Activity 5
Stream Profile
Site - Anywhere along a stream

Teacher Reference - Needham and Needham - Fresh Water Biology

OBJECTIVE

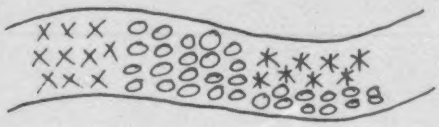
To study the elevation and bottom changes occurring along a stream and to relate this data to temperature and species fluctuation.

Equipment and Materials

Thermometer
Range pole
Level
Hand screen
Hand lens
Plastic bags
Labels
Stirring stick
Graph paper

ACTIVITY PROCEDURES

1. Each group of three students will be assigned a 10 ft. portion of the stream. For your section of the stream, examine the bottom of the stream - working from downstream to upstream. (Some portions of the stream bottom may contain large pebbles, other sand or silt). Make a sketch of your stream bottom.



x = large pebbles
o = small pebbles
* = silt

2. Record temperature of water for each different bottom type. Enter on sketch.

   Record air temperature ____________

3. Samples of the stream bottom should be collected for each different bottom section. Put each sample into a separate plastic bag.

4. Organisms - Place the screen on the stream bottom referring to the pattern sketch for placement. Gently agitate to bottom (upstream of the screen) to dislodge organisms living there. Remove the screen and place on bank. Sift through the material and collect the organisms in plastic bags. Do this for each different area on the stream bottom. Label the bags properly. Gather leaves and sticks from the different stream areas in your section and place them on the screen for examination. Any animals adhering to these objects should also be collected in the appropriately labeled plastic bags. Make a thorough search. Take no more than two organisms of the same type/bottom site.

5. Elevation - Use the double range pole to obtain elevation changes for each stream section. Use the same technique as shown by your teacher. Record the total elevation change from the beginning of your site to its end. Elevation __________________
Make a sketch to scale the elevation of your stream section.

6. Plant Material - Collect plant samples from each of your bottom areas and the adjacent stream bank. Place in plastic bags and label. After all collections and calculations have been made, your teacher will give instructions relating to graphing of data. When all information has been plotted on a class graph, answer the following questions.

   A. Were there any temperature differences between swift and slow moving portions of the stream?
   Ans. Swift - cooler

   How do you account for this?
   Ans. Swift areas offer greater evaporation - greater cooling.

   B. Where were most organisms found - in the debris or free swimming? How do you explain this?
   Ans. Debris - the debris provides a habitat and shelter for the organisms.

   C. What are some means animals have for preventing themselves from being carried downstream with the current?
   Ans. Means of attachment; body form is flattened.

   D. What other observations can be made about the stream in addition to those already made?

OTHER CURRICULUM AREAS

Math

Included with activity.

Art

Photograph or draw stream organisms.

History

Research to find out when major flooding of stream had occurred and what damage it caused.

Science

Determine the food web existing in the area of stream examined.

Language Art

Write compositions about daily struggle for survival.

Make a cross-word puzzle using new terms learned.

Activity 6
Constructing a Cruising Stick
Sites 1 - 9 or school site

OBJECTIVE

To construct and use a device (cruising stick) to measure the diameter and height of trees.

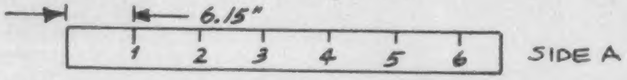
Equipment and Materials

Yardstick or piece of hardwood 1" x 1", ruler with tenths, black indelible ink marker.

ACTIVITY PROCEDURES

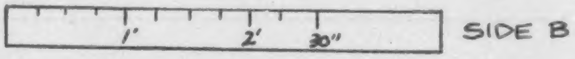
1. Making the cruising stick

   A. On one side of your cruise stick, mark off equal sections 6.15 inches apart.



   B. Label the first mark 1, the second 2, and the third 3.

   C. On the opposite side of the stick, mark off 30 inches in tenths, numbering each foot.



2. Measuring diameter - Using cruising stick, (Side B), marked off in inches:

   A. Hold stick horizontal to ground at eye level.

   B. Sight along one end of stick along outer edge of tree.

   C. Sight along other edge of tree and record numbers where line of sight crosses stick.

   Observation ____________________

   D. Repeat the above procedure but stand at 90° angle to your previous position.

   Observation ____________________

   E. Average the two readings.

   Average ____________________

3. Measuring tree height - Using cruising stick (Side A), marked off in 6.15 inches:

   A. Stand 66 feet from tree (about 23 paces).

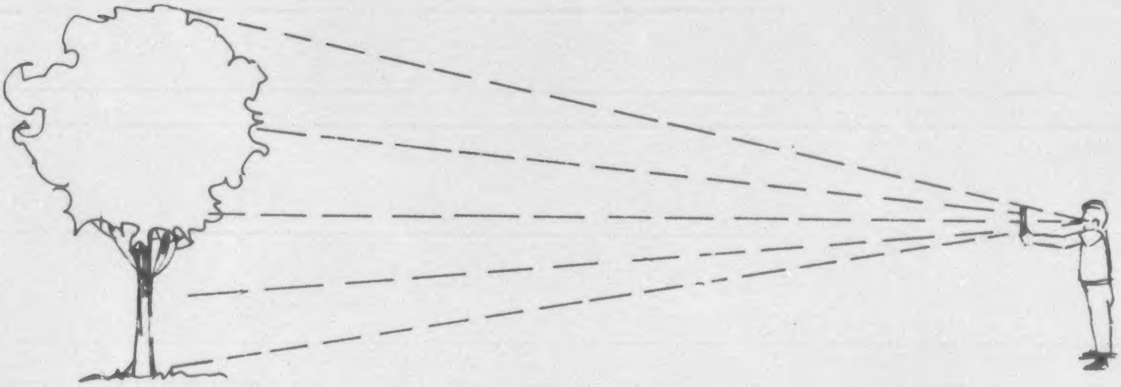
   B. Hold arm out horizontally and stick vertically at arm's reach - 25 inches from eyes.

   C. Slide stick up or down until top of stick is in line with the top of the tree.

   D. Without moving head, sight to bottom of tree (be sure stick is still vertical) and record the place on the stick where line of sight crosses it.

   Observation ______________________________

   The nearest figure is the number of 16 foot lengths in the tree. If the figure is 2, there are 2 (16 foot) log lengths in tree. The tree is 32 feet high - 2 x 16 feet. Diameter of tree or branch should be, at least, 10 inches to have economic value.



CONCLUSIONS

1. What value does tree measurement have for the forester and landowner?

2. How does branching affect number of logs available in the tree?

3. How does space between trees while growing affect the amount of branching?

4. How is the type of tree related to the amount of branching?

4. In the area designated by your teacher, measure and record the heights and diameters of 20 trees.

Tree	Diameter First	Diameter Second	Average	Number of 16 Foot Legs	Height of Tree Number of Legs x 16 Ft.
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

OTHER CURRICULUM AREAS

Art

Draw or photograph the pond and its immediate surroundings.

Math

Measure depth of pond (average); circumference of pond. Compute area of pond. Determine volume of pond.

Have students compute the number of board feet in the woodlot. Inquire from lumber yards, the cost of lumber and then have them compute the timber value of the woodlot.

Language Art

Have students write to Agencies of Federal or State Government inquiring about career opportunities in the forestry agencies.

Have students write how insects or other organisms move through water.

Tape the sounds of a pond and its surroundings.

History

Have a representative of a forest agency come and speak about the history of forestry in the United States or Pennsylvania.

Research the history of a pond - find out if it is manmade or natural.

Science

Identify different trees in woodlot and determine which trees comprise canopy, understory and ground story.

Have students diagram the inter-relationships of organisms in the pond.

Nature

Make plaster casts of footprints in exposed mud along side of pond.

Activity 7
Study of a Decaying Log or Tree Stump
Site 1 - 9 or school site

OBJECTIVE

To develop awareness and understanding of the natural processes which occur following the death of a tree.

Equipment and Materials

Magnifying glass, pencil, nail, keen powers of observation.

INTRODUCTION

A dead tree, killed by the activities of insects, other animals and parasitic plants which is has hosted, is usually felled by a storm or strong wind. The bark may still be on or off. The planst and animals that continue to inhabit the fallen tree change the wood both physically and chemically. At this stage, the inside may be soft and spongy while the outer shell remains firm. In this condition, you may find small mammals such as shrews or white-footed mice, as well as salamanders living in or near the log.

Finally, the log will disintegrate and become a part of the debris material on top of the soil. In time, decay will continue and this log will become a part of the humus layer which becomes a vital part of the topsoil.

ACTIVITY PROCEDURES

1. Find a deal log or tree stump for study purposes.
2. Answer the following questions about the specimen. Please do not damage the log or tree stump anymore than is absolutely necessary.

OBSERVATIONS

1. Is the bark still on your tree? ________
2. What kind of tree do you have? ________
3. Is the wood soft enough so that a nail could be pushed into the wood? ________
4. Is the wood dry or moist? ________
5. Estimate how long ago the tree died. ________
6. Is the tree still standing or has it fallen? ________
7. Is your study log or stump serving as a home for vertebrates (animals with backbones)? ________
8. Are there any insects living in or on the decaying wood? ________
9. Are there any plants growing on the log or stump? ________
10. List all organisms (plant and animal observed on or in your log or stump.

Species	Estimate of number present

CONCLUSIONS

In the space provided below, draw a sketch of the food web of your decaying log or stump. Show feeding relationships among the various inhabitants (plants, insects, vertebrates, etc.) by means of arrows from "eater" to its food. (e.g. birds eat insects. Draw a line from the bird to the insect eater). Base your decision upon both personal observations and library research.

Comments and other conclusions.

OTHER CURRICULUM AREAS

Art

Have students make a model or diarama of a log and its inhabitants.

Science

Using insect keys, have students identify type of insects living in log.

Have students identify type of fungus, lichen, mosses, etc., living on log.

History

Estimate or determine, if possible, age of log.

Have students find out about events and life styles, etc., occurring when tree was a young seedling.

Nature

Have students mount and preserve insect types and plant types.

Activity 8
Food Web in a Stream or Pond

Teacher Reference - P. 101 "People and Their Environment, Outdoor Lab"; P. 552-555 "A Sourcebook for the Biological Sciences"

OBJECTIVE

To help students understand that all organisms living in a given community are dependent upon each other.

Equipment and Materials

Large wide-mouth bottles, etc., which have been thoroughly cleaned, dip nets, hip boots or waders (or sneakers), shovel, bucket, scraping tool.

ACTIVITY PROCEDURES

On this field trip, you will be taken to a shallow stream which can be waded. Pupils will be divided into teams for collecting aquatic plants, small organisms (by taking samples of water at different depths to get micro-organisms), large organisms and collections from beneath rocks if they are present. A thorough cross-sampling of the body of water should be made. Each group should have a secretary to make notes of any organisms seen but not collected. The secretary should make sure his or her team has done a thorough job of sampling.

CONCLUSIONS

1. Why do so many organisms live together?

   Ans. The habitat is sufficient enough that it can support many organisms.

2. Why do they live in a community?

   Ans. All organisms have inter-relationships with other organisms. They are dependent upon one another for food supply, etc.

3. What serves as food for protozoa, fish, insects, salamanders, etc?

   Ans. Algae, other protozoa, fish or insects.

4. From where do the algae derive their source of food and energy?

   Ans. The sunlight provides the energy source needed to produce their own food.

5. What is the relationship of the amount of O_2 in the water to algae and sunlight?

   Ans. The greater the amount of sunlight, the better the opportunity for the algae to undergo photosynthesis and, therefore, produce more O_2 as a by-product.

Laboratory

Each team may identify and relate organisms to others in the web. Each secretary puts such information on a chart. All students with the help of the teacher will compile a food web of life in this given body of water.

The above should lead to assignments or discussion of the following:

1. How does a changing community (succession) affect food webs?

   Ans. The organisms must adapt to changes in the community by altering their diet.

2. What happens if a given organism becomes extinct? How does it affect the existence of other members of the food web?

   Ans. Rarely does an organism feed exclusively on a given species and, therefore, the other numbers who fed on that species would just adjust their diets to include more of those organisms still available.

3. What effect do changes in the environment as temperature, moisture, etc., have upon a food web?

   Ans. Organisms survive under optimum weather conditions. Severe alterations could wipe out certain non-tolerant species causing changes in the food web.

4. Discuss producers, consumers and decomposers as found in the food web.

   Ans. The specific examples of these groups depend on the stream studied. The producers would include all species of plant life; the consumers, the animal life; the decomposers, the bacterial population.

5. Why can an individual organism not live without other organisms?

   Ans. All organisms are interdependent which is especially demonstrated in food relationships.

6. How does a food web involve the exchange of matter and energy?

   Ans. When taking in matter when feeding, all consumer levels obtain energy which will be passed on to a higher level if fed upon.

7. How are the number of alternate pathways in a food web related to the stability of the community?

   Ans. The greater the number of pathways, the greater the stability of a community. Thus, if one species becomes extinct, the members of the food web will not be greatly affected as they are feeding on other species.

8. Student comments and questions.

   ____

   ____

   ____

   ____

   ____

   ____

   ____

   ____

OTHER CURRICULUM AREAS

Art

Diagram the food web of the stream using drawings, pictures or photographs.

Language Art

Make a hidden word sheet using names of organisms identified and new terms learned.

History

Compute volume of flow of stream, velocity, temperature, etc.

Nature

Look for evidences of land animals or mammals who use the stream or pond. Look for tracks, trails, burrows, etc. Make plaster casts of tracks or try to identify tracks.

Math

If you are studying a pond, try and compute circumference of pond, average depth, then compute volume of pond.

Activity 9
Line Transect Study
Site 11 - Field or school site

Teacher Reference - "Habitat Study Transect Study", Environmental Science Center, Golden Valley, Minn., P. 21-37

OBJECTIVE

To obtain data from field measurements for later use in discovery of natural relationships.

Equipment and Materials

Students and teachers should wear work clothes, 150 ft. clothesline marked every 10 feet with waterproof ink, clothes hanger loop, trowel, thermometer, wooden pegs, ruler, insect nets, camera (to take a picture of each site location), foot-candle meter (1 per class) or light meter.

ACTIVITY PROCEDURES

Choose an area where there appears to be a variety of microhabitats. Place a peg into the ground and extend the clothesline in a straight line. Mark the position of the other end of the clothesline with a second peg. Each lab group is to be responsible for the study of one specifically-marked area along the clothesline. A clothes hanger loop is to be used to establish the limits of your location. Place your observations on the data sheets.

Important - At the conclusion of the survey, your hole must be filled in and left as near the original condition as possible.

POST ACTIVITIES

Upon returning to the classroom, a class graph should be made for each of the following factors plotted against the number of the transect station:

1. Plant types against transect station
2. Number of plant types against transect station
3. Insect types against transect station
4. Number of insect types against transect station

Organize your class so that each student and his lab partner will be placed into one of four groups. Each group is to prepare a list of suggested reasons for the similarities and differences found in the class graphs. These will then be discussed as a total class group so that conclusions can be made. These conclusions must be based upon the supporting data.

CONCLUSIONS

1. What suggested reason did your group come up with for the similarities and differences found in the class graphs?

   A.

   B.

   C.

2. Looking along the transect, where does the surface temperature, ground soil or sub-soil vary the most? Why?

3. Is there any progressive change in temperature for three or more transect stations?

4. By looking at the collected data, can temperature be considered as a determinant of number and types of life? Is there a certain type of plant or insect found only in the warmer transect station? The colder transect station?

5. Does light intensity at various stations appear to be a determinant factor? (support with data).

6. Examine the display for different types of soil. Can you think of any reasons why different types of soil might exist along this transect?

7. Is there a possible relationship between moisture and a plant type or plant numbers? Between an insect type or numbers?

8. Why are there different amounts of moisture along the transect line? Is there a possible relationship between moisture and light intensity? Between temperature and moisture?

OTHER CURRICULUM AREAS

Art

Paint pictures of plants using water colors.

Nature

Press leaves of different plants or flowers and make herbarium mounts.

Language Art

Make a vocabulary list of words and definitions used in the activity.

History

If this study is done in a field, find out how long it has been a field. Determine if it had been farmed. Find out how long ago farming of the field ceased.

Math

Convert metric measures into English and Fahrenheit measures to help students grasp for themselves the relative sizes obtained using metric measure.

Science

Bud Cole

Science Along The Trail

CONCEPTUAL THEME

Module has been designed to provide students with a general introduction of science as pertaining to the environment.

OBJECTIVES

Upon completion of these activities, students will be able to:

1. Become more aware and appreciative of the natural environment.
2. Better use their senses in observing the environment.

The teacher may wish to have students keep a log of their experiences. It will be their personal property and they may write or draw sketches. It should not be corrected or criticized. Students may want to record feelings, questions, facts, and anything else they feel is meaningful to them.

Activities have been made general enough to allow the teacher to use them at various sites. Many of the activities can be used in all parts of the study area. This will not limit the teacher and will allow for comparative studies.

Equipment and Materials

The following science activities are designed to use a minimum of equipment. The students use their senses to expand their science knowledge and appreciation of the environment.

Several thermometers
*Collecting dishes
Student logs
*Pencils

*indicates material to be provided by teacher

PRE-ACTIVITIES

The activities in the module are extensions of a variety of classroom learning situations. Due to the many concepts developed, specific pre-activities have not been listed.

POST ACTIVITIES

Each student should develop a follow-up project of his choice based on the concept that interested him most.

OTHER CURRICULUM AREAS

Math

1. Convert temperatures into centigrade.
2. Various counting activities - types of trees, animals, birds, etc.
3. Develop concept of "area" using string to set aside small plots as observation areas - compute the area in square inches.

Art

1. Plaster casts of animal tracks.
2. Splatter prints of leaves and other natural forms.
3. Sketches of spots that students liked best.
4. Create animals using pebbles and glue.
5. Photography projects.

Language Art

1. Creative writing
2. Poems
3. Spelling lists using words developed in module.
4. Student-made riddles, crossword puzzles, etc.
5. Create dramatizations involving the history of the area.

History

1. Have students research the early history of the area.
2. Discuss the uses of the area in relation to the needs of early settlers. Have students decide what areas could have been used for various activities.

Nature

1. Interdependence of plants and animals.
2. Competition between plants and animals.

Concept #1 - Sound is an integral part of man's environment.

Activity

Upon entering the wooded part of the trail, have the students close their eyes and listen for sounds. Have them try to identify what is making the sound.

Questions

1. What sounds did you hear?
2. What sounds are natural?
3. What sounds are man-made?
4. Which sounds did you like best? Why?
5. Could any of the sounds be considered pollution?

Concept #2 - The heat and light of the sun are necessary to life on earth.

Activity

Have the students measure the temperature of an area where the sunlight reaches the ground. Compare this to the temperature of a nearby shaded area.

Questions

1. Which is warmer? Cooler?
2. Are heat and light necessary to life on earth?
3. Is there a difference in the undergrowth in areas where sunlight reaches the ground?
4. What blocks the light in the shaded area?
5. Is there a difference in the types of larger trees?

Concept #3 - Organisms respond to differences in heat and light.

Activity

Observe an organism such as a plant found in a field or wooded area.

Questions

1. What is the temperature of the area?
2. What is the intensity of light in the area?
3. Note the number of times you observe that type of organism under the same conditions of heat and light.

Activity

Take a pond sample in a sunny and a shaded area.

Questions

1. What is the temperature of the water in a sunny area as compared to the temperature in a shaded area?
2. Are the same types of organisms found in both samples?
3. Do you note as great of a temperature difference in the temperatures taken at the sunny and shaded areas of the ground area compared to the pond area?

Activity

Observe a small tree.

Questions

1. What did the tree develop from?
2. Where did it start in the soil?
3. Was there light in the soil?
4. Did it need light then?
5. How was it able to live without light?
6. Why does it need light now?

Activity

Observe an area of soil.

Questions

1. What do you see in the soil?
2. Are there any living organisms in the soil? Can you identify any of them?
3. How do the organisms respond to light?

Concept #4 - In using his environment, man often abuses it.

Activity

Have students look for evidence that man has been in this area. Give specific boundaries and a time limit for making observations. Have them list what they find. Possible evidence - litter, nails in trees, ax marks on trees, fireplaces, time marks, footprints, etc. Go over lists with students.

Questions

1. How did the things get there?
2. How can this be changed?
3. How do you feel when you find this in an area of this type?
4. What can you do to help?

Concept #5 - Life continues as earth's materials are reused.

Activity

Observe a fallen tree.

Questions

1. What would you expect to find if you returned in five years?
2. What would the forest look like if trees fell and nothing happened to them?
3. Would forest life continue? Why or why not?
4. What will happen to the tree?

Activity

Observe a rotten log.

Questions

1. What is happening to the log?
2. Does it help the forest? If so, how?

Activity

Have the students find evidence of organic objects that are starting to decompose. Examine the soil to find some of the decomposing organisms.

Questions

1. Do the leaves make any contribution to the life of the forest?
2. What will happen to the leaves?
3. What will happen to any animal remains?

Concept #6 - Fungi contribute to the balance of nature.

Activity

Have students watch for fungi along the trail.

Questions

1. Why are fungi different from other plants?
2. Where do they grow?
3. Do they produce their own food?
4. Where do they get their food?
5. Why are they important?
6. What does the fungi have to do with the materials being reused?

Concept #7 - Soil is a basic necessity of life. Rocks are physically broken down into soil particles through weathering.

Activity

Discuss the different agents of weathering such as temperature changes, water and wind. Look for evidence along the trail and stream which indicate that weathering is taking place.

Questions

1. What has caused the rocks in the stream to become rounded?
2. What has happened to the small particles that have broken away?
3. Why is the bedrock on the opposite side of the stream rough and pitted?
4. Do you think the smooth rocks in the stream have the same make-up as the bedrock?
5. Can you find evidence of pieces of bedrock in the stream?

Activity

Have several students rub two pieces of shale or sandstone together over a piece of paper. Examine what has happened.

Questions

1. How might this process happen in nature?
2. What is the result of such action?
3. Does man ever use this process to his advantage?

Concept #8 - Soil is divided into layers or horizons.

Activity

Find eroded areas along the stream where the different layers of the soil can be seen. Compare areas to determine differences between the texture of organic matter and the color between horizons.

Questions

1. How does the texture of the layers differ?
2. Where do you find the smaller particles?
3. Where are the larger particles found?
4. What do you notice about the rock particles in the soil?
5. How long might it take for good soil to form?
6. What caused the soil layers to show in this area?
7. What may happen to trees along the bank if this erosion continues?

Concept #9 - The environment determines the kind of plants that grow in a certain area.

Activity

Observe and discuss the plants that are found in various sections of the study area. Note the differences in plants along the stream, in open areas, thick areas, near and in the pond, level and steep areas, etc.

Questions

1. Are the plants different in various areas?
2. Do their individual needs determine where they grow?
3. Why might you find the same type of plants near the stream and the pond?
4. Do the plants compete with each other to meet their needs? If so, what would be a good example of this competition?
5. What would happen if the environment of one of these areas suddenly changed?

Concept #10 - The environment of an area determines the type of animals that live there.

Activity

Observe the animals in the study area. Look for their homes, foods, tracks, etc. Note the animals seen on, in or near water that had not been seen in the wooded areas.

Questions

1. What animals did you find in or near the water?
2. What animals were found in the forests or in the fields?
3. Why are these animals found at these areas?
4. How are these animals equipped to live in this environment?
5. Do you think these animals could successfully live in a different environment? Explain.
6. Where were the most birds found?
7. Why were they located in that area?
8. What happens to an organism if the environment changes?
9. If the environment changes, will the animals need to change?

Concept #11 - An increasing awareness of the beauty of our environment is necessary to our well being.

Activity

Before leaving the study area, have the students answer the following questions silently.

Questions

1. How do you feel as you stand quietly here?
2. What sounds do you hear?
3. What colors do you see?
4. What do you smell?
5. Have you felt this way before? When?
6. What do you think causes you to feel the way you do?
7. How do you think you would feel if there were no places like this to visit?
8. Should areas like this be set aside for man to come and enjoy his environment? Why?

Science

Frank Creazzo
Grade 6

CONCEPTUAL THEME

All organisms are dependent upon one another for survival.

1. An organism is directly related to its environment.
2. Green plants are the primary food-producing organisms.
3. Energy required by all organisms is derived from the food produced by green plants.
4. Big animals eat smaller animals, smaller animals feed on smaller animals, etc.

OBJECTIVES

Upon completion of these activities, students will be able to:

1. Define a pond food chain in a brief paragraph.
2. Construct a model of the pond food chain at Jacobsburg State Park.
3. Show an understanding of the interdependence of organisms in a given environment by constructing the model of the food chain.
4. Discover that the environment is directly related to the food chain in an environment by comparison of the pond and stream.

Equipment and Materials

- *15 Microscopes
- 15 Enamel Pans
- 15 Small hand shovels
- 15 Thermometers
- 15 Measuring Sticks (to determine depth of water)
- *15 Clipboards
- *30 Pencils

*indicates material to be provided by teacher

PRE-ACTIVITIES

Discuss the interdependence of organisms in nature. Bring out through discussion that the food chain of organisms is directly related to the environment of those organisms.

Define the following terms:
Parasite, Scavenger, Community, Environment, Bacteria

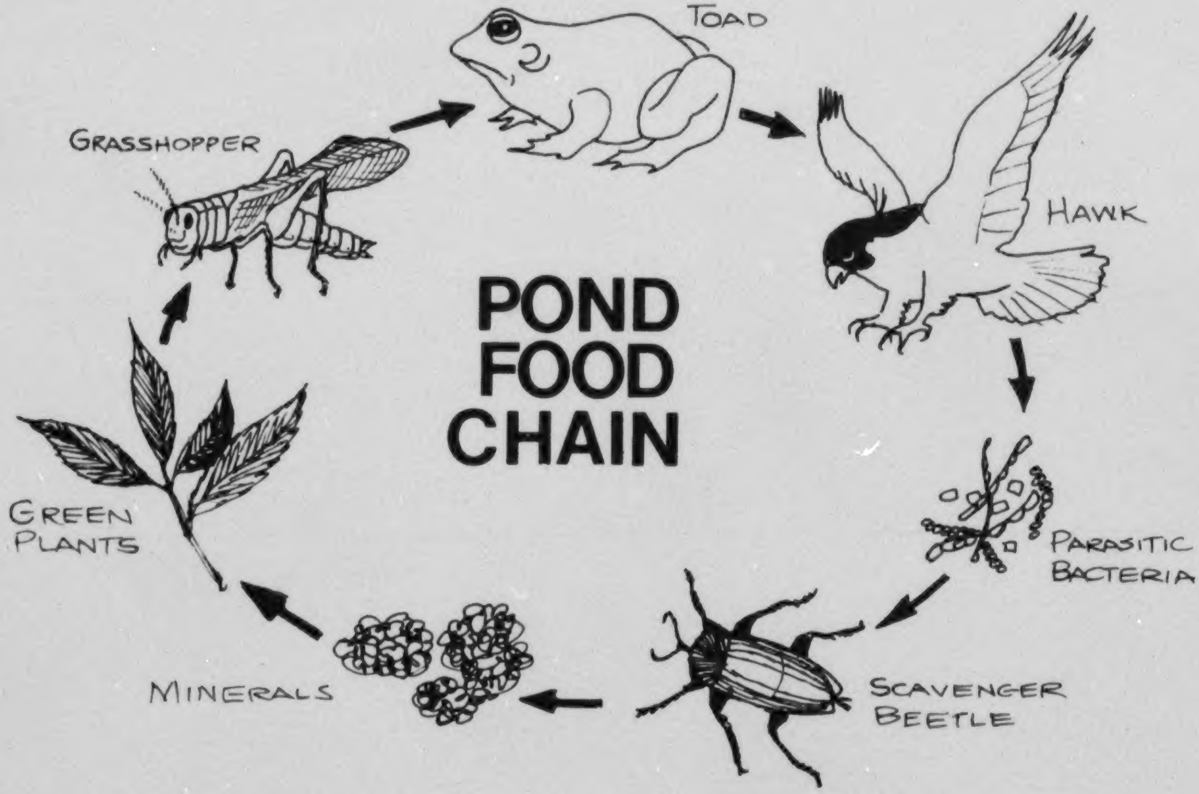
Make a display of the Jacobsburg pond food chain and discuss the relationship of the interaction.

Background Information

Meanings of words and terms:

Producer - Green plants
Consumer - Eaters
Decomposers - Bacteria
Parasites - Host
Habitat - Living areas
Living Environment - Other plants and animals
Recycling - Reuse

The producers start the food chain. Then food is passed from consumer to consumer. Parasites might enter the chain when the organism dies. Scavengers will then "clean up" the carcass. Decomposers will return the "left overs" back to the soil for the producers.



Explanation of display

In this community, grasshoppers feed on green plants while toads feed on the grasshoppers. Some of the toads are then eaten by hawks. Bacteria parasites live inside the hawk and, at last, they cause the hawk to die. The hawk's body now will be used by scavenger beetles and by decay bacteria and fungi. As the hawk's body is digested, most of it will be turned into simple materials (minerals) which will be used by green plants.

ACTIVITY PROCEDURES - Site 10

Give each student a Student Activity Sheet, a clipboard and pencil so that they can record data from each activity.

In each activity, have one or two students assigned as group leaders to perform the key function of the activity.

Activity #1

Scoop up a panful of water from the pond. Look at it under a microscope.

1. What type of animal life do you see?
2. Where does this animal life fit in the food chain?

Activity #2

Scoop up some mud from the bottom of the pond. Examine the vegetation and undersides of the leaves of the water plants.

1. Where do these organisms fit in the food chain?
2. What part of the food chain is eaten by these organisms?
3. What part of the food chain do these organisms feed upon?

Activity #3

Take a plant from the pond and examine it to see if any animals are feeding directly from the plant.

Activity #4

Examine the pond in relationship to the stream. How does the environment differ?

1. Vegetation of pond vs. vegetation of stream.
2. Temperature of pond water vs. temperature of stream water.
3. Animal life in pond vs. animal life in stream.
4. Water movement in pond vs. water movement in the stream.
5. Soil in pond vs. soil in the stream.

After this examination, determine the type of environment needed for the pond food chain.

POST ACTIVITIES

1. Have the students take pictures of various organisms and arrange them in a food chain example.
2. Have the students set up an aquarium with animals and plants like those found at the pond. Notice if the food chain differs from that of the pond site. How? Why? Notice if the food chain occurs at all. Why? Why not?
3. Have the students study different types of environments and food chains related to those environments. Compare and contrast these food chains to the pond food chain.

OTHER CURRICULUM AREAS

Art

Students can paint or make paper mache models of the pond food chain.

Language Arts

Poetry and creative writing could describe the food chain.

Nature

The balance of nature could be discussed in depth with such a lesson.

TEACHER REFERENCE

1. The Book Of Popular Science, Vol. 10
   Grolier, Inc. USA, 1970, pages 206-207
2. Collier's Encyclopedia, Vol. 8
   Crowell, Collier and MacMillian, Inc., 1966, page 517
3. Collier's Encyclopedia, Vol. 15
   Crowell, Collier and MacMillian, Inc., 1966, page 402
4. Compton's Encyclopedia, Vol. 5
   F.E. Compton Co., Chicago, Ill., 1965, page 154
5. Britannica Junior Encyclopedia, Vol. 5
   Encyclopedia Britannica, Inc., Chicago, Ill., 1970
   page 220

Science

Nancy Hydusik
Grade 7

CONCEPTUAL THEME

1. Competition among living things exist where any of the life requirements are not available in sufficient amounts to supply the demands of all the organisms in the environment.

2. Organisms in a community compete with one another for the essential elements for life and survival.

3. Dominant plants are those plants in a community that establish the conditions for growth or lack of growth of other community members.

4. Predominate plants are those plants which are most numerous in a community.

5. Subdominant plants are those plants in a community which tolerate the conditions set by the dominant species.

OBJECTIVES

Upon completion of this activity, students will be able to demonstrate a fundamental understanding of the concept of the struggle between plant organisms in the environment by:

1. Identifying the dominant, predominant, and subdominant plants within a given community.

2. Estimating the various plant populations and recording this data.

3. Observing the interactions among the plants as they compete for sunlight and moisture.

4. Recognizing the physical features of the environment as the determining factor for plant survival.

Equipment and Materials

- Common Trees of Penna.
- Wild Flower and Plant identification manuals
- Data sheets
- Pencils
- Notepads
- Measuring Tapes
- Yardsticks
- Masking Tape

PRE-ACTIVITIES

1. About two weeks before the field activity is to be presented, have a group of students plant twenty bean seeds in a milk carton of garden soil. In a second carton, plant five bean seeds. The cartons should be placed where they will receive an adequate amount of sunlight and should be watered frequently. During the time the plants are in the classroom, students can observe plant growth and record their observations. On the day before the field trip, place the plants on the front desk and ask:

   A. What have you observed as the plants grew?
   B. What differences can be seen between the cartons?
   C. What substances and energies have the plants used for growth?
   D. What plants appear to be the strongest? Why?
   E. What plants appear to be the weakest? Why?
   F. What conclusions have you reached at this time concerning competition among living things?

2. During the two week period, the teacher should prepare a lesson in which the terms competition, dominant, predominant, subdominant, community, population, and interaction are discussed thoroughly.

   A suggested lesson would be to write the words on the blackboard and have students write what they think each word means. Then have students compare their meaning with the ones from a science reference book.

3. Slides of the science sites and any other slides of Jacobsburg Park can be presented to the students so that they can become acquainted with areas that are to be studied.

4. Students are to be instructed as to the use of the Biltmore Stick for estimating diameter of trees and the Merritt Hypsometer for estimating height.

ACTIVITY PROCEDURES

1. Divide the class into four small groups and explore the designated science area, Site 1.

2. Group A will identify as many plants and trees as possible and estimate their respective populations. Plants are to be recorded as dominant, predominant, and subdominant on the data sheet.

3. Group B will measure and record the distance between the small plants having a diameter of 1 inch or less and height under 2 feet.

4. Group C will measure and record the distance between plants having a diameter of 8 inches and height of 6 feet. The Merritt Hypsometer will be used for estimating height and the Biltmore Stick will be used for estimating diameter.

5. Group D will measure the distance between plants having a diameter of 16 inches or more and a height of 12 feet or more. Record this on the data sheet.

6. All students are to observe the amount of sunlight and moisture received by their particular groups of plants.

7. Allow sufficient time for students to complete and record their observations. After all groups have finished, students are to assemble and disseminate their respective data.

8. Students are then to answer and discuss the following questions with a student leader:

   A. How many different species of plants can you identify?
   B. How is it possible that in a given area many different species can be found?
   C. What kinds of plants are the tallest?
   D. Are they one kind or several kinds?
   E. Do these plants compete among themselves for sunlight and moisture?
   F. Would these plants be considered dominant, predominant, or subdominant?
   G. How do these plants affect the growth of other plants in the community?
   H. What plants were the most abundant?
   I. Would they be considered dominant, predominant, or subdominant?

J. How do these plants compete among themselves for sunlight and water?
K. How do these plants affect the growth of other plants in the community?
L. What plants make up the bottom cover of the community?
M. Would they be considered subdominant? Why?
N. What plant life grows the greatest distance apart? What plant life grows the least distance apart?
O. What plant life receives the greatest amount of sunlight? What plant life receives the least amount of sunlight?
P. Which plants need the greatest amount of moisture? Which need the least amount?
Q. In what ways can a plant adapt to meet its demands from an environment? Did you observe any adaptations in the plants you studied?
R. In general, which plants survive in community?

9. When discussion questions are completed, ask students to draw up a list of conclusions based upon their observations. These may be completed at the site or at home. Conclusions will be brought to class the following day.

POST ACTIVITIES

Conclusions may be related in several ways:

1. Students may prepare charts for display in the classroom showing relationships among the different kinds of plants.

2. A bulletin board display composed of drawings and pictures tying together all the conclusions.

3. Prepare dioramas (miniature scene) of the site.

4. Assemble a panorama (comprehensive scene) for the purpose of portraying size relationships and plant competition.

EXTENSIONS

What can be done to further the experience beyond the activity?

1. As an extension of this activity, ask a group of students to set up a supplementary display of the site as they think it would appear in fifty years.

2. Develop a class discussion around why the site might look this way. Lead questions could include:

    A. Are the same plants dominant, predominant, or subdominant?
    B. Why do you think there would be a definite change?
    C. Would there be a possibility of new species appearing in the area?

3. Discuss ways in preventing or reducing the future environmental changes suggested by the students.

4. Further discussion can result in critical thinking involved in answering such questions as:

    A. Why are environmental changes taking place faster today than years ago?
    B. What are some ways that plants and animals alike can be helped by man to adjust to environmental changes?
    C. What happens to the balance of nature when a group of plants or animals cannot successfully compete with other organisms in the community?
    D. Is man in competition with other organisms for the necessary life essentials? How?

OTHER CURRICULUM AREAS

Math

1. Measurement of the height and diameter of plants using the Biltmore stick and Merritt hypsometer.

Art

1. Photograph site studied and various plant species.
2. Make sketches of plants that are dominant, predominant, and subdominant.
3. Preparation of dioramas and panarama of site studied.
4. Draw charts showing comparison of plant height and diameter.
5. Assemble display of the site in the future using clay models and other art materials.

Language Art

1. Prepare vocabulary lesson using key words from module.
2. Creative writing, write themes about plant competition and related concepts of struggle for survival of all organisms.

History

1. Discuss the importance of the natural flora of the area to the types of industry, homes, and early settlers.

Nature

1. Identification of the form, sounds, odors and textures seen at the site.

Science

Charles Romanell
Grades 7-8-9-10

CONCEPTUAL THEME

Soil composition occurs in many varieties. Their compositions affect and are altered by the plant and animal life they support.

1. Soil is composed of many different particles resulting from the breakdown of rock.
2. The composition of soil is altered by the presence of decayed matter.
3. Varying composition of soils retain different amounts of water.
4. Its ability to retain water is related to the types of plant and animal life it supports.
5. Compaction of soil is undesirable for plant growth and animal activity.
6. Chemical qualities of soil result from the origin of the soil and the abilities of plant and animal life to survive.

OBJECTIVES

Upon completion of this activity, students will:

1. Become aware that soils are composed of many different size particles by measuring the size of different particles present in the soil.
2. Become aware that soil composition can be determined by comparing the physical and chemical characteristics of its layers.
3. Become aware that the ability of soil to hold water is determined by its composition.
4. Become aware that frequent use of an area will cause an undesirable compaction of the soil and its causes upon plant and animal life in this area.
5. Be able to determine the chemical composition by measuring the amounts of nitrates, potassium and acidic and basic qualities of the soil.

6. Become aware of the cyclic interactions between the soil and life.

7. Become aware of the affect of man's alteration of soil and the damages it causes, resulting in the many, many hundreds of years it takes to restore it to its original formation and balance maintenance.

Equipment and Materials For 30 students

30 Sheets of white paper
12 Geologic hammers
12 Hand lens
2 100ml graduated cylinders
6 Soil Thermometers
2 pkg. data sheets and paper
Soil test kit
Water

PRE-ACTIVITY

1. Map study of various sites to be visited.

2. Discuss what to look for when sites are visited.

Field Activity

During this activity, it is feasible or necessary to have the students visit two or three different sites or areas for the comparison of soil types and the collection of data.

While approaching the first site, stimulate conversation regarding the occurrence and composition of soil. Students should have an acquaintance with such physical phenomena as weathering and erosion so a discussion can be initiated.

Where do you see stones? Are there many on the surface of the soil?

Soil Formation

Involve the students in the investigation of soil formation. Examine different stones for color, texture, etc. Compare them to the color of the soil and composition of the soil.

Rub two stones together over a white sheet of paper. Compare them to the soil. Using the hammer, crush some of the stones (caution them on safety procedures). Note the similarities. Squeeze a sample of the soil and the crushed particles. Note any comparisons. Smell the two samples. What is the difference between the particles of fine granulated stone and soil?

Discovering Exact Composition of Soil

Can you think of any specific characteristics of the soil that we can measure or describe? Lead the students to recognize the following:

1. The amounts of various sizes making up the soil.
2. Difference between surface soil and subsoil.
3. Mineral composition of the soil.
4. Amount of organic matter in surface soil.
5. Water holding capacity.

Measuring Amount of Particle Sizes

Fill a graduated cylinder to the 10ml mark with soil sample. Add enough water to the sample to fill the cylinder to the 20ml mark. Shake and let stand for 10-15 minutes. Observe and record data on data sheet. Entertain a discussion.

How many layers did you observe?

What were the sizes of the particles in the different layers?

What relationship exists between the number of layers and the ability of plants and animals to live in the soil?

What result would you expect if we repeated this procedure taken from 18" to 24" below the surface? Obtain a sample using an auger.

Mineral Composition of the Soil

Distribute soil testing kits to the students. Open kits and discuss the mineral components to be measured. Have them carry out various test measurements and discuss results.

Organic Matter in the Soil

Discuss the natural process of recycling of plant and animal matter with soil.

Have the students select a small plot and examine material lying on the soil's surface. List the various materials which they find (plant and animal). Discuss terms litter, duff and humus. Have them record the feel and the smell of decaying materials.

Follow with discussion:
How did the litter differ from the duff? How did the duff differ from the humus?

Water Holding Capacity of the Soil

Fill a graduated cylinder to the 50ml mark with a soil sample. Add 50ml water. Allow it to stand for a minute or two. Carefully pour the water back into another cylinder, measure the amount retrieved. Record results. Repeat the activity in a different area (compact). Record results.

POST ACTIVITIES

1. Conduct a survey of animal life in various soil strata and population distributions. Repeat the study in various areas and soil types and compare results.
2. Have the students research micro-elements necessary in the soil for healthy plant growth.
3. Visit a landfill area or school grounds and carry out similar soil tests.
4. Invite a resource person to discuss various types of soil in their area (school).
5. Have the students develop survey techniques to determine agricultural practices in the area and discuss the uses of artificial fertilizers and substitutes for natural components.

Audio Visual Aids

Nitrogen Cycle B/W, UWF
The Dust is Dying Color, 14 min. USDA
Rain on the Plains B/W, 9 min. USDA
Face of the Earth Color, 12 min. EBF
Wearing Away of the Land B/W, EBF
(Wearing down forces on earth)
Birth of the Soil EBF
(Weathering of rock material)

Charles Romanell

CONCEPTUAL THEME

Comparison of soil erosion at park site and school site.

OBJECTIVE

Upon completion of this activity, students will be able to investigate the causes of soil erosion and prevention.

PRE-ACTIVITIES

Prepare students for visit to Jacobsburg Park Site by giving them a brief description of site areas to be studied.

1. Show films on weathering and erosion.
2. Note examples and places of erosion.
3. Note where materials are deposited.
4. Note size and kind of deposit.
5. Sketch the eroded areas and make an estimation of the time it took to cause the erosion.
6. Note gradient of eroded banks and size of gully.
7. Was erosion the cause of the present stream or was it caused by some other force?

Assignment

Note examples of erosion as you return home. Draw your own conclusions.

Developing the Concept

1. What energy was used to move the materials in this area?
2. What type of change is the matter undergoing?
3. Where does it go?
4. What is being lost?
5. Why should the soil be kept?
6. Where does this happen most often?
7. What does the velocity of the water have to do with the amount of material that is carried by the stream?
8. What happens when the velocity is less?

Extending the Concept

Investigate erosion near your school.

1. What has been done to prevent it?

2. Why should urban or city people be concerned with erosion and the scientific method of preventing it?

3. Use films to demonstrate how to prevent and stop erosion.

4. The class should stress the reasons for this method and why it is necessary. Include some of the following.

   A. Strip cropping
   B. Terracing
   C. Contour plowing
   D. Forest and woodland planting

Have some students investigate velocity and stream carrying power.

Have some students make a contour map of school grounds.

Invite resource people to assist in study.

Instructional materials

1. Pamphlets

2. Soil Conservation Packet (may be procured from Soil Conservation Office)

Films:

Topsoil B/W, USDA
Erosion B/W, USDA
Conserving Our Soil Today COR
Study of Soil COR
What is Soil? EBF
Soil Conservation Today SVE

Michele Parvensky
Grade 10

CONCEPTUAL THEME

The geology of soils, how time changes the features of an area.

OBJECTIVES

Upon completion of this activity, students will be able to:

1. Draw a soil profile, determine and record texture, structure, pH, temperature and color of each layer and finally be able to construct a soil monolith.
2. Demonstrate the ability to determine the best uses of land in the area.
3. Conduct quadrat studies and identify organisms which make up the humus, duff and litter areas.

Equipment and Materials - For 30 students

6 pH kits
3 Soil thermometers
6 Hand lenses
6 Hand levels
6 Six-foot rods
6 Soil samplers (construct by punching a hole in half a metal aspirin box)
1 Bottle glue
6 Pocket knives
*24 Pieces of cardboard cut to fit the soil sampler
*12 13cm x 20cm pieces of cardboard
6 100" tape measures or rods
6 Yard sticks
6 Northampton County Soil Survey reports
6 Mineral composition kits
*6 Bottles 10% HCl

*indicates material to be provided by teacher

PRE-ACTIVITIES

The student should be thoroughly indoctrinated in the tests that are to be conducted at Jacobsburg prior to the field trip. The activities are written for, at least, tenth graders for an all day stay at the park. However, since four sites are involved, it may be to the discretion of the teacher to utilize any of the sites for a shorter period of time.

Students should be familiar with pH, using the County Soil Survey, what soil is - profiles, etc. These can be done in the classroom and on school grounds, especially quadrat studies.

Students should know something about the geology of the area so they will primarily see the Martinsburg formation which is basically shaly slate along the creek. They should also know that glaciers have affected the area since the questions which are asked of them at Site #2 will be utilizing this fact. An early history of the area discussed with the students will greatly help, especially the fact of the 1936 flood breaking the dam and its effects on Sites #6 and #7. If the students are not told this fact, you may want them to write their assumptions to the question to see their conclusions.

Students should know how to use hand levels. Exercises again can be done on the school grounds.

Special Note - For Activity #6, it may be helpful to contact the Soil Conservation Service and borrow their soil monoliths so students can get an idea of a larger profile.

ACTIVITY PROCEDURES

It would be wise to have students carry clipboards with them so that all their data can be accurately recorded, profiles drawn, etc., without constant danger of dropping sheets and crumpling them.

Questions are included in the activities. However, it is strongly suggested that you review the sites before taking your class and have other questions for your students.

Activity #1 - Quadrat Study Site #2

Notice the small island along the stream bank. Walk around it. Is this really an island? How was it formed? As you walked to the island, you should have noticed the change in elevation. What does this tell you?

Stake out an area on the island 1m x 1m. Complete the following chart.

Term	Describe Feel	List Identifiable Plants and Animals
Litter (identifiable dead things on surface)		
Duff (partially decomposed organic matter)		
Humus (almost completely decomposed non-identifiable organic matter)		

What purpose is served by the organisms which you found? Which layer contains the most material? Explain.

Moving upstream in an area along the bank itself, Activity #2 may be conducted.

Activity #2 - Soil Profile Study Site #2

Before undertaking this activity, you should be aware what soil is and be able to give a description as to how it is formed and what type of rocks influenced the soil formation in this particular area. What evidence is there to support your theory?

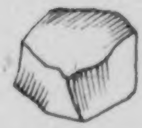
Clean an area on the bank so that, at least, three horizons are visible.

1. Draw a picture of your profile.
2. Determine and record the depth of each horizon.
3. Smell the soil and describe its odor.
4. Determine and record the color of each horizon.
5. Determine and record the pH of each layer.

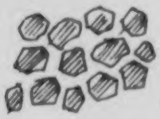
   Note: You should be familiar with acidity and alkalinity and the use of a pH kit for soil before these exercises.
6. Determine and record the texture. Texture is determined by feel and looks as follows:

   Sand - gritty
   Silt - smooth and slick, not sticky
   Clay - smooth, plastic, very sticky
7. Determine and record the temperature of each layer.
8. Determine and record structure. Pick up a handful of soil and carefully break it apart in your hand. Using your hand lens, which of the following does it most closely resemble?

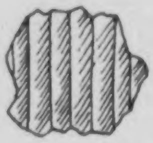
Blocky



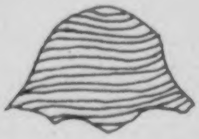
Granular



Columns



Platey



After your results are recorded, notice and record the plant life in the area. What type of conclusions can you draw in regards to plant life vs. soil.

Additional suggested activity at soil profile site. Mineral composition studies which may be tied in with plant life.

Soil Profile

Data

A. Horizon: Topsoil

Depth______" to ______"
Texture______Structure______
Color______pH_____Temp______

B. Horizon: Subsoil

Depth______" to ______"
Texture______Structure______
Color______pH_____Temp______

C. Horizon: Parent Material
Depth______" to _______"
Texture______Structure______
Color______pH_____Temp______

D. Type of Rock in Bedrock

Use the following information to help you analyze your data.

1. Effects of soil depth on plant growth and water storage.

   Deep - 42" and over - excellent plant growth and water storage
   Moderately deep - 20" to 42" - good plant growth and water storage
   Shallow - 20" and under - poor plant growth and water storage

2. Effects of color on soil

Soil Surface Color A Horizon	Amount of Organic Material	Erosion Factor	Aeration	Available Nitrogen	Fertility
Dark dark grey, greyish brown to black	Excellent	Low	Excellent	Excellent	Excellent
Moderately dark dark grey, dark brown to dark yellow-brown	Good	Medium	Good	Good	Good
Light Pale brown, yellow-brown to yellow	Low	High	Low	Low	Low

Subsurface Soil Color (B Horizon)	Condition
Dull grey (low rainfall soils)	water-logged soils, poor aeration
Yellow, red-brown, black (forest soils)	well drained soils
Mottled grey, brown or yellow (humid soils)	somewhat poor or poorly drained soils

3. Effects of texture

	soil water holding capacity	looseness
Sand	Poor	Good
Silt	Best	Good
Clay	High (low availability to plants)	Poor

4. Effects of structure

Type	Penetration of Water	Drainage	Aeration
columns	good	good vertical	good
blocky	good	moderate	moderate
granular	good	best	best
platey (low rainfall soils)	moderate	moderate	moderate

1. What is the potential of this soil for water storage and plant growth?

2. How does the texture and structure of soil affect movement of water and air through soil?

3. Does the pH change as you go down? Explain.

4. How does the temperature change as you go deeper into the soil? Will the air or soil temperature change fastest during the day? How does the air temperature compare with that of your soil temperature?

5. Does your soil have good water holding capacity? Why?

6. Does your soil have good fertility? How can you tell?

Activity #3 - Determining Slope Site #2

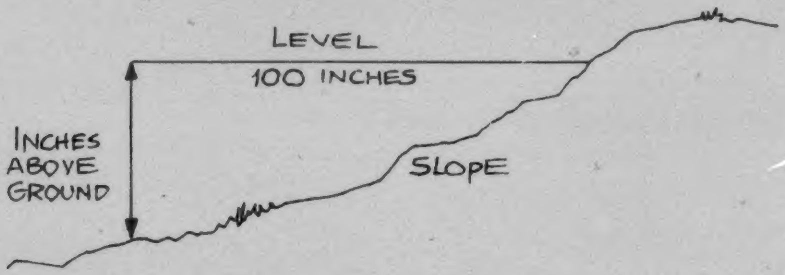
1. Select a place which you believe represents the average slope in the area.

2. Place one end of your 100" tape on the slope you want to measure. Hold outright to be level.

3. Place the level on the outright stick. Raise or lower stick until level.

4. Measure the number of inches the free end of the stick is from the ground.

5. The number of inches is the slope of the land in per cent.



Activity #4 - Erosion Study Site #2

Scour erosion is a type of erosion caused by water running off the land. Slope, type of soil, and number of plants are all factors in affecting the amount of soil that will wash away.

Types of scour erosion include:

1. Sheet erosion - removal of soil without easy to see channels.

2. Rill erosion - many small shallow finger-like channels.

3. Gully erosion - deep ditches

As you walk along Site #2 toward Site #6, what type or types of erosion do you see? Is this erosion natural? What could be done to prevent this erosion? Is the degree of erosion at your site:

1. None - undisturbed topsoil

2. Moderate - small spots of subsoil show

3. Severe - no topsoil left

When your soil studies are complete, continue along Site #2 into the forested area. You will come to a site with several logs. What is happening to them? Why is it essential? What will be their eventual fate? Where does all this material go? Is it important?

Site 5

Following the trail along the creek, you will notice an outcropping. Walk over and examine the rock. To what class of rocks does this belong? This suggests what type of area this was in geologic history. Is the rock debris in the stream the same as the outcropping? Explain. Observe that all the rocks are not horizontal. Some seem to be dipping into the creek. Why? You will notice many indentations in the rock. Suggest how these occurred. Why do we find this outcropping here and not on the other side of the bank? Do you know the name of this formation?

Notice the rock debris on several ledges above you. How do you suppose it got there? You should also observe the plant life found in this area. What is so unusual about it? What is this caused by?

Site 4

Site #4 should be approached from the stream bed. You will notice an island off to your right. Walk over to it. Is it an island? How do you know? Using your hand levels, send out rod men and map this island. Does its elevation differ greatly from the stream bed? Why? What is the composition of this island? What event does this suggest?

As with Site #2, quadrat studies should be conducted here. Do your results coincide with those of site #2?

Walking in the stream bed above the island near the left bank, you will notice bedrock in the channel. What is happening to it? Why do we find it here and not on the other side of the stream? Also, notice the steepness of the bank on the left side. What has caused this? Soil profile studies should be conducted along this site and results compared with those of site #2.

Site #8

Site #8 should also be approached from the stream bed. Walk down to the site of the old dam. You will be able to notice the slate walls still standing. To the immediate left of the dam site, you will notice a stream coming into the Bushkill. Walk up this area and notice the bank. Draw a soil profile. Does it differ from site #2. Explain. Notice the light colored material in this stream bed. Pick some of the material up and rub it through your fingers. What is it? How did it get here? Examine the banks on both sides of the creek near the spot where the stream enters the creek. Is the profile the same as the stream area? Explain.

Activity #5 - Land Capability and Land Use

Land has been classified into eight classes of use. Using the data you have collected from your soil study, determine from the following chart the land capability class of your field area study.

Class	Slope	Erosion Hazard	Soil Depth	Drainage	Texture	Use and Management
I	0-3%	None	Deep	Well drained	Loam or silt loam	Cultivation - good soil management practices
II	3-12%	Slight	Deep	Moderately well drained	Fine sandy loam or clay loam	Cultivation - few special conservation practices
III	12-20%	Moderate	Moderately deep	Somewhat poorly	Sandy loam or silty clay	Cultivation - several special conservation practices
IV	20-30%	Severe	Shallow	Poor	Sand or clay	Occasional cultivation-many special conservation practices
V	0-2%	None to slight	Deep	Well to poor	Stony	Pasture, woodland, wildlife; machinery cannot be used
VI	30-50%	Very severe	Deep to shallow	Well to poor	Sandy, silty or clayey	Pasture, woodland, wildlife; machinery cannot be used
VII	50-90%	Extremely severe	Deep to shallow	Well to poor	Sandy, silty, clayey or stony	Pasture, woodland, wildlife; recreation watershed; machinery cannot be used
VIII	All	None to extremely severe	Deep to very shallow	Excessive to very poor	Rockland, dune sand, river wash	Wildlife, recreation, watershed

The most limiting soil factor will determine the land capability class. For example: a soil with slope of 0-3%, erosion hazard none to slight, soil moderately deep, drainage poor, texture silty clay, sould be Class I and could be used for occasional cultivation with many special conservation practices needed.

Your field study area had _______% slope; ________erosion hazard; ________soil depth; _______drainage; ___________ and texture.

Take your Northampton County Soil Survey Report and Soil Map of the Jacobsburg area. What soil groups are found in your site area? What is the legend for these groups? Give a general description of the soil as found in the survey report. What are the limitations of this soil group? If this area were not to be set apart for a state park, what would it best be suited for? Prepare to justify your answer.

Activity #6 - Making a Miniature Soil Profile

When you have identified the horizon boundaries, you are ready to make a miniature soil profile that will serve as a permanent record of your observations. This consists of small samples of each horizon mounted on a piece of cardboard.

Procedure:

1. Place a cardboard chip in the bottom of your soil sampler.

2. Spread some glue on the cardboard chip.

3. Press the sampler into a chunk of soil taken from the uppermost horizon.

4. Break off excess earth with a pocket knife, leaving a natural surface about the thickness of the sampler depth. Do not cut the sample off even with the edges of the sampler, as the process of cutting destroys the natural appearance.

5. Push the tip of the pencil through the hole in the sampler to remove the sample.

6. Draw the soil profile to scale on the mounting board to show the relative thickness of each horizon.

7. Glue your sample to the center of the area of mounting board allocated for the uppermost horizon.

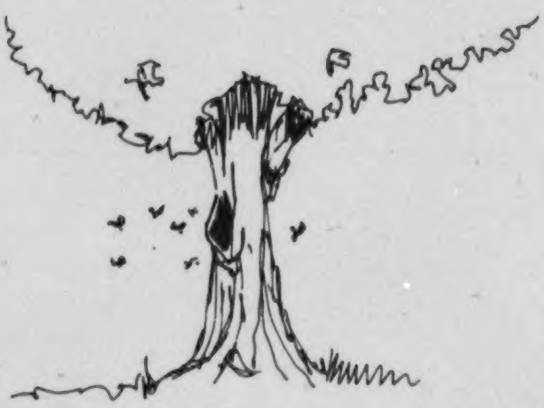
8. Repeat the procedure for the other soil horizons and the second soil profile. When finished, place the samples in a box for safe transport home.

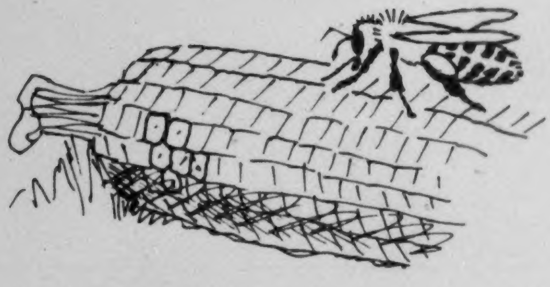
LANGUAGE ART

M K O D
U I L U
P C H A R
T B V D O
S K L E
Y U V S
N A G B

Language Art

Ruth Guida
Grade 5





CONCEPTUAL THEME

Man depended on nature for several foods that he could not produce for himself. One of these was honey.

OBJECTIVES

1. To make children aware how man was able to provide his food from natural sources.
2. To strengthen their researching skills.
3. To develop the ability to report information accurately.
4. To strengthen their listening skills.
5. To help the children develop their ability to observe their surroundings.

Equipment and Materials

One corncob soaked in slightly salty water
Sugar water (one part water to one part sugar)
Several drops of anise oil
A small piece of honeycomb
A mixture of honey, vinegar and warm water
Five pieces (small) of bark

PRE-ACTIVITIES

This lesson could start as an outgrowth of a social studies lesson. Ask the class what people did in the days when supermarkets were not available. Where did the various types of food come from?

Most of the children will develop the concepts of farming and hunting as the sources of food in those days.

Ask where the sweet substances such as maple syrup, sugar, and honey come from. Most children this age are aware of the source of maple syrup. They may not be aware of the origins of sugar so you may have someone look them up.

Try to get across the concept that these two substances are grown because they are made from the original living source. Then ask if honey is grown or hunted. The class may get into an argument over this questions depending on their knowledge of the source of honey.

Lead the discussion into what or who makes honey, how is it made, and where is it made? Most children in this area already know about beehives. Ask them where it can be found in the natural environment. If they don't know, introduce the term "bee tree" and let them figure out what it might be and where they might find one.

Next, they need to find out how to go about locating one. Assign five students the responsibility of finding out how to find a "bee tree". They may use the library, ask various people or any other way they can think of to get this information. This group will be responsible for reporting to the class the methods they have found and the materials necessary for locating a tree.

Divide the class into five groups and assign one of the research committee to each group as its leader. Have each group bring in a different type of bait to be used. These are listed under equipment in the beginning.

ACTIVITY PROCEDURES

Take class to Jacobsburg Park, but not to the site of the bee tree. Instead, place the groups at various spots around the location of the tree. Have them place their bait according to the directions of the group leader. They are to watch for bees until they are sure the bees have established a supply route from the bait to the tree. This may take a little while so you may have the leaders review the method of locating the tree while waiting.

The bees, when they have established their supply line, will rise from the bait, circle twice to get altitude and then will fly to the honey tree.

The leaders may assign each member of their group a number so that they will not all follow the same bee, but each will have a chance at locating the tree. If they lose track of their bee, they must return to the group and take their place at the end of the group.

When the child finds the tree, he should then have another place to go where there is supervision and, at the same time, is unable to tell the others who are looking where to find the tree.

When all the children have located the tree, they will probably be filled with questions as to how the honey could be gotten from the tree. This is a good time to discuss how the people cut down the honey-filled trees, what they did to prevent getting stung, and how they left some honey in the tree to keep the bees over the winter. If possible, it would be a good idea to have a section of a real honey tree available for the class to examine. At Jacobsburg, there is a piece of a honey tree on Dan Hite's porch. Perhaps you might be allowed to use this for your class.

FOLLOW-UP ACTIVITY

When the children have found the tree, the teacher could then either take posed pictures herself or have one of the students take them. These could be used in a booklet which the children can make about their search for the bee tree. The children can write captions for the pictures besides writing reports and stories about their day at Jacobsburg.

If the Art and Wood Shop teachers are willing, the class could make a natural bee hive model that could be opened to see what a cross section would be like. This model could then be placed in the school's learning center.

OTHER CURRICULUM AREAS

Math

Geometry of structure of comb

Art

Design of beehive
Flight of the bee - pattern

Science

Study of the habits of bee flight
Study the process of making honey
Bees as "Social Insects"
Communication among bees

Nature

Study of animals that would use the bee tree for food
Importance of bees in the maintaining of plants and crops, how the loss of bees' pollination of plants could lead to the extinction of man.

Home Economics

Introduction on a higher lever to a unit on "Natural Foods"

EXTENSIONS

Foxfire Book #2
Encyclopedias
Laura Ingalls Wilder's series of "Little House" books
Local resource people

Language Art

Ronald Gori
Grades 4 through 8

INTRODUCTION

Though many children express their creative urge spontaneously through the written word, others find this a difficult medium of expression.

It is the responsibility of the teacher to give the needed guidance in each case. Most children need specific guidance as well as opportunity if they are to reach their potential. This is most effectively accomplished in an atmosphere in which each child can express his ideas freely, knowing that he will receive not only appreciative comment on writing which gives evidence of vivid expression, originality, awareness, imagination, and invention, but also recognition for his best efforts even when he falls short of the goal he has set for himself.

Creative writing is concerned with artistic self-expression. In creative writing, emphasis is on the expression of the ideas, feelings, and imagination of the writer. It is the kind of writing in which the child, in one way or another, expresses his feelings, ideas, or reactions to an experience, real or imaginary.

The activities for this creative writing module may be carried out at points 7 and 9.

Each location should have abundant vegetation, moisture, etc., necessary to support various types of animal, plant, and insect life.

CONCEPTUAL THEME

Any outdoor experience can be the basis for creative writing in the form of stories, poetry, simple plays, and storytelling.

OBJECTIVES

General Objectives - As a result of the activities that follow, the student's interest in language arts will be stimulated. He will also develop the ability to communicate through the various means of expression.

Specific Objectives - Upon completion of this activity, students will be able to:

1. Realize the importance of utilizing all of their senses in making observations.
2. Collect information and data about the living things they discover in the field and forest community.
3. Develop an understanding about the diversity of life that exists in a field and forest community.
4. Practice in recording and writing about interesting events they have experienced in the out-of-doors.
5. Use their imaginations through storytelling, writing and dramatics.

Equipment and Materials

Pencils
Paper (hard writing surface)
Magnifying glass (optional)
Camera (optional to record area activity took place)

PRE-ACTIVITIES

1. Have a discussion about how we learn or know that certain things are so. Ask questions that will direct the responses to a particular sense. For example: On a warm day, how can you tell when it is raining? (Feel it - by getting wet; See it - coming down and puddles forming; Hear it - sound of the rain as it hits different surfaces; Smell it.)
2. Demonstrate that there are different levels of perception. For example: Some people look without really seeing or listen without really hearing. (A game might be played such as recalling the number of different trees on the playground or different sounds heard on the way to school in the morning. Place a number of different items on a table and allow the students to examine them for a few minutes and then have them list as many things as possible that were on the table.)

3. Have the students describe something on the playground such as a tree, flower or other familiar object in as much detail as they can recall. The members of the class might try to guess what the other students are trying to describe.

4. Discuss the ways in which the above descriptions rely on the various senses.

ACTIVITY PROCEDURES

After selecting a habitat area (forest, field, aquatic), discuss the following questions:

1. What animals would you expect to find living here?
2. What do these animals need to survive?
3. How could you determine if these animals are here?
4. Where would you look for animals around here?

Divide the class into small groups. Explore the area for about half an hour. Record animals that are seen or evidence of animal presence (partly consumed food, excrement, homes). List food sources that may be used by animals.

Have the class answer the following questions:

1. What animals or evidence of animals were found?
2. What were the characteristics of the area?
3. How was it similar or different from what was expected?
4. Why is this area more or less desirable for animals to live in than another area?
5. Are the needs for survival present?

POST ACTIVITIES

1. Have students compare what they observed while in the field.

2. Have the students describe in various ways, with as much detail as possible, the experiences they have had.

3. Have the students put themselves in place of one of the animals or plants they have observed and write an exciting story about a certain time in that plant's or animal's life.

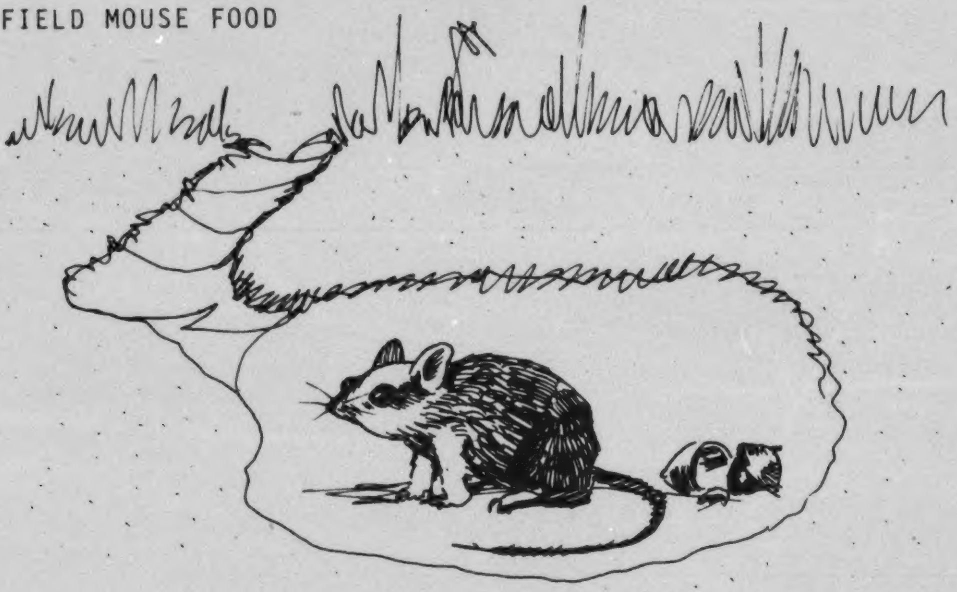
4. Pass out cards containing the following information which might be used by slower students as a basis for their story. (See following sheets)

IN THE GROUND BENEATH YOUR FEET

What's in a handful of soil from a park or a forest floor? Bits of broken leaves and stems, sand, pebbles, some clay - that doesn't seem like much. Yet in this handful of soil , there may be billions and billions of living things. Most are too small to be seen without a microscope. These masses of tiny organisms crowd the soil to its limits. We call any place where living things are found the biosphere.

The earth beneath your feet feels solid; but it really is not. In fact, many soils seem only half full, but the spaces between the particles of soil are filled with water, air, and living things. The great numbers of living things do not live right in the soil itself, but rather between the soil particles. The soil supports and protects life. These pages that follow tell of some inhabitants of this vibrant world.

FIELD MOUSE FOOD

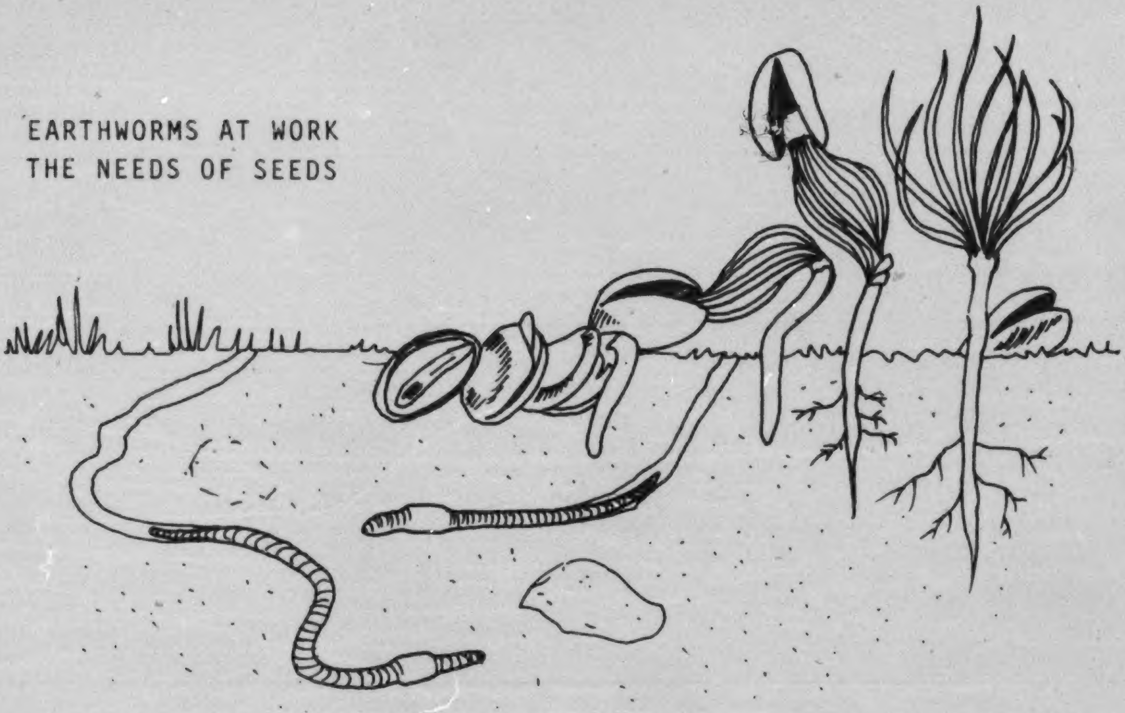


Just a ball of soft fur, two shiny black eyes, and a short tail - the field mouse doesn't look like much. However, it plays an important part in the lives of many larger animals. Weasels, skunks, foxes, hawks, owls, eagles, snakes - too long a list to mention, all depend on field mouse food. One female mouse may have 13 litters of four to eight young in a year.

The field mouse spends the winter in an underground burrow. When the weather warms up for a few days, it comes out of its nest for food and water.

Day and night, the field mouse is on the go during warmer weather. It has to be. Every 24 hours it must eat its own weight in food. In one acre of soil there may be 300 mice, but as many as 12,000 have been found in a single crowded acre.

EARTHWORMS AT WORK
THE NEEDS OF SEEDS



Ever see a robin tugging at an earthworm in the ground? Earthworms seem to be delicious food for robins, and they are important for the soil and its plants.

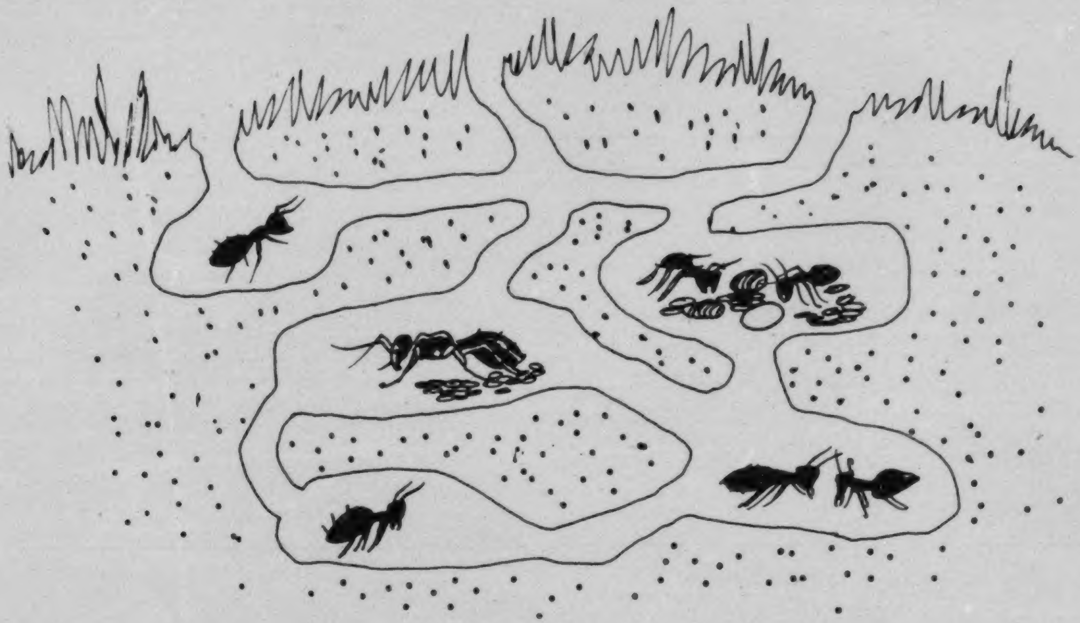
Earthworms feed on soil. As they eat their way through soil, they leave many small tunnels and air holes. Through these tunnels and holes, air and water can reach the roots of plants. Often, you can find little heaps of soil scattered across a lawn. These are called castings. They are the soil and the waste materials that passed through the earthworm after it digested its meal.

Most earthworms are not very big (though in Australia, some reach a length of 11 feet). As many as a million earthworms may live in an acre of ground. Several tons of soil pass through their bodies every year. By stirring up the soil and making it airy and spongy (so it holds moisture), earthworms help improve soil.

Twisting and turning like a corkscrew, a seed's delicate looking tip drives its way through the earth. A growing seed has enough force to push through three inches of asphalt road bed. If water reaches a ship's cargo of bean-seeds, they will begin to grow and burst the hold.

A seed needs at least two things to sprout: warmth and moisture. Water enters through a tiny opening in the seed's surface. As the seed swells, the coat breaks open. The stem and leaves push upward, and the roots grow down into the ground. The tiny plant is called a seedling.

ADVICE FROM KING SOLOMON



"Go to the ant, thou sluggard," advised King Solomon, "consider her ways and be wise." Constantly scurrying around carrying things to and from their nest, ants are busy animals.

If you could see inside an anthill, you would find lots of activity. You would see one queen ant, a few male ants, and many, many worker ants. Worker ants may be nurses, builders, housekeepers and soldiers.

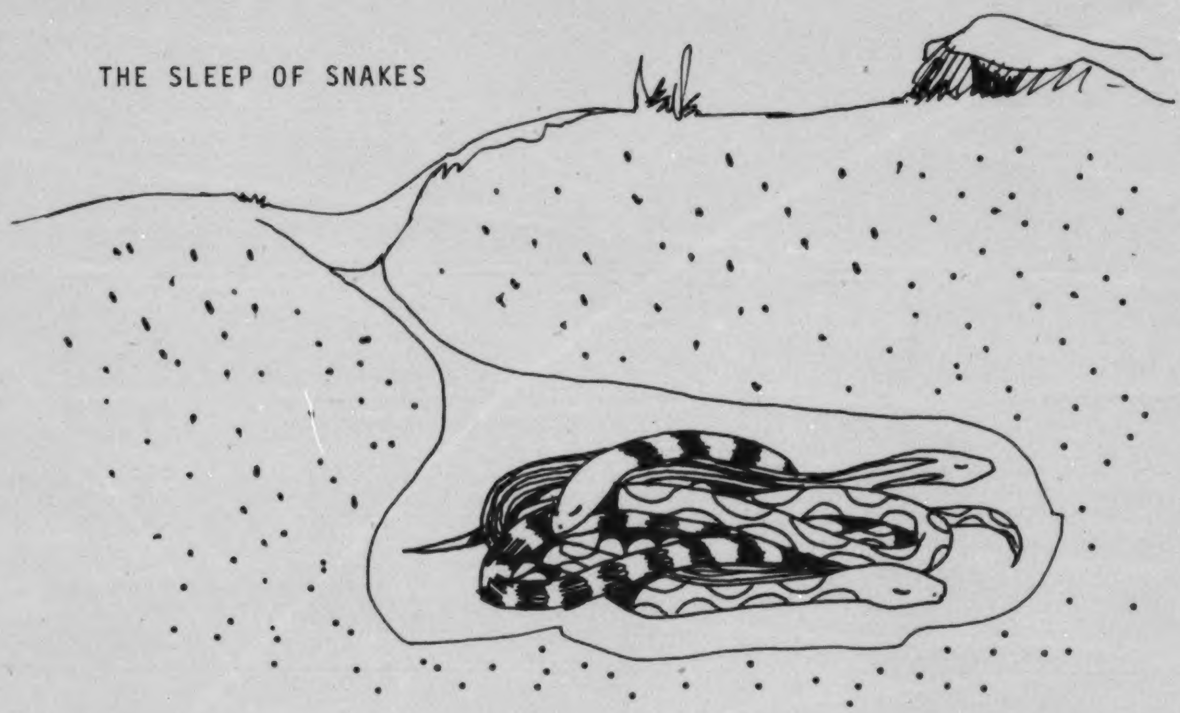
Nurse ants care for the eggs laid by the queen. The larvae that hatch from the eggs are white and have no legs. The nurses carry them about to the places in the anthill and feed them from their own mouths.

After a while, each larva spins a cocoon about itself. Often these cocoons are called ant eggs, but they really are not. They are the pupae, or resting stage of the ant. Young ants come out of the cocoon. Most of them are worker ants.

There are many different kinds of ants. Some kinds, called harvester ants, store large supplies of seeds in their nests.

Certain kinds of ants raid other ants' nests and steal cocoons. The cocoons hatch, and the new ants take over the work as slaves in their captors' nest.

THE SLEEP OF SNAKES



It has been a hard, cold winter. Patches of snow still linger in shady places beneath the trees. The frozen ground is just beginning to thaw in the gentle warmth of an early spring day. There seems to be no sign of life. Yet even in the cruelest winter, life goes on.

Deep within the ground where there was no danger of freezing lies a strange burrow. Here in the late autumn, large numbers of snakes had collected. Intertwined, they sleep the deep sleep of hibernation. They are mostly of the same kind, although sometimes two different kinds winter together. Some return to the same place to hibernate year after year. When spring comes, they awaken and scatter. Their life above ground begins once again.

OTHER CURRICULUM AREAS

Art

Conduct a class exercise in which each student develops an artistic representation of his feelings for his natural surroundings. These feelings may be expressed as a painting, model, etc.

As a result of this activity, students should be able to react to the following questions.

1. How does this creation represent your feelings?
2. How will man fare in a world increasingly technological and materialistic?
3. Will art forms become an escape from this world as a means of improving it? Why?
4. Have the class collect and/or observe various art forms in nature and study these in relation to mechanical strength, adaptation, and method of living.

Nature and Science

Set up a terrarium simulating a woodland, bog, or desert environment. Have students observe and record as many examples of interdependence in the community as possible, being specific as to why one organism is dependent on another.

Ask for hypothetical situations which suggest any of a number of "upsets" that could occur to the balance of the nature community.

1. What would be the effect of too many plants on our environment?
2. What problems would be created by the overabundance of one type of insect in our environment?
3. How would a substantial decrease in sunlight harm our environment?

BOOKS OF INTEREST TO CHILDREN

Baranowski, Richard. Insects, Golden, 1964.

Cooper, Elizabeth K. Insects and Plants: The Amazing Partnership. New York: Harcourt, 1963.

Fabre, J. Henri. Insect Adventures. Dodd, 1958.

Green, Ivah. Animal Masquerade. New York: Coward-McCann, 1955.

Klots, Alexander B. and Elsie B. Klots. Living Insects of the World. Doubleday, 1959.

Milne, Lorus J. and Margery Milne. The Senses of Animals and Men. Atheneum, 1962.

Riedman, Sarah R. Naming Living Things. Chicago: Rand McNally, 1963.

BOOKS OF INTEREST TO THE TEACHER

Baker, Will, Wildlife in American History. Washington, D. C.: Robert B. Luce, 1962.

Baker, Will. Winter Sleeping Wildlife. New York: Harper and Row, 1958.

Breland, Osmond P. Animal Life and Lore. New York: Harper and Row, 1964.

Kalmus, Hans. 101 Simple Experiments With Insects. Doubleday, 1960.

Scott, John P. Animal Behavior. Chicago: University of Chicago Press, 1958.

Storer, John H. The Web of Life. New York: Devin-Adair, 1956.

Language Art

Ann Lipari
Kim Ritchie
Eugene Nealon

Grades 7-8-9

CONCEPTUAL THEME

The purpose of the activities in this unit is to stimulate students in communicating ideas they have about the environment around them. It is realized that many of the activities can be accomplished without using the natural environment, but it is felt that the direct experiences out-of-doors will give the students an opportunity to develop their senses to their greatest potential and to establish an awareness of the natural environment and their relationship to it.

OBJECTIVES

Upon completion of this activity, students will be able to assume the responsibility for and carry on the action that will be necessary for environmental improvement. Are all experiences interpreted by the senses?

1. Have students realize the importance of utilizing all of their senses when making observations.
2. Give students practice in recording and writing about interesting events they have experienced in the out-of-doors.
3. Provide opportunities for the students to visualize and personalize experiences into their own communities.
4. Enable students to recognize that learning experiences occur by listening.
5. Help students develop a conversation vocabulary.
6. Learnhow the natural environment serves as inspiration for storytelling, poetry and creative writing.
7. Utilize at least three of their senses in describing objects found in the natural environment.
8. Identify adjectives as descriptive words having sensual qualities by listing words which describe objects found in natural environments.
9. Identify adjectives as a means of communicating emotional reactions to objects and events by using adjectives which describe their own reactions to the objects experienced.

10. Recognize words which name or identify objects as nouns by preparing lists of various objects found in a particular area.

11. Recognize words that communicate some change or action as verbs by listing action words associated with the objects defined.

12. Structure complete sentences using several adjectives describing the noun.

13. Create ryhthmic sentences and identify the grammatical parts of the sentences they have written.

14. Have daily schedules planned by:

    A. Teacher
    B. Teacher-Student
    C. Student-Teacher
    D. Student

Equipment and Materials

Activity 1 - Comparing and Contrasting Our Descriptions

Type of earphones or other means of blocking out hearing, blindfold, tape recorder, pencil and paper, clipboard.

Activity 2 - Listening to Sounds

Paper and pencil, and clipboard.

Activity 3 - Blind Walk

Blindfold, rope and stick.

Activity 4 - Brainstorming

Blackboard, poster paper or experience chart, dictionary, clipboard, pencil and knapsack.

Activity 5 - Field

Tape recorder, record player, records of bird calls, other animal sounds and other sounds of nature, camera. Read poem, "The Way Through The Woods", by Rudyard Kipling, in the book, Favorite Poems Old and New, by Helen Ferris, Page 242.

PRE-ACTIVITIES

Activity 1 - Comparing and Contrasting Our Descriptions

People are handicapped by the loss of a sense. How does a loss of hearing, seeing, talking, touching, smelling or tasting affect you?

Let's experiment. Taking small groups, have the children experience the loss of a sense. Have them discuss their reactions.

Activity 2 - Listening to Sounds

Take class out to curb and sit quietly listening to the sounds around them. Take a trip to Bethlehem Steel and record the sounds heard. Do the same while standing under a bridge.

Activity 3 - Blind Walk

Take a trip to a school for the blind. Examine the equipment used by a blind person. For example, braille typewriters. In the classroom, have a small group experience being blindfolded and finding their way around.

Activity 4 - Brainstorming

Being familiar with terms makes one feel smart, especially when dealing with our environment. Make a chart and describe each vocabulary word listed.

Soil	weathering, erosion, humus, mantle, germinate, dormant, topsoil, subsoil, bedrock, loam, silt, clay, water table, crop rotation.
Water	pollution, condensation, evaporation, contamination, purification, chlorine, filtration, distilled water, reservoir, algae, sewage.
Forests	chlorophyll, chloroplast, epidermis, conifers, cambium, photosynthesis, taproots, termites, botomist, cellulose, lichens, sequoia, simple leaves, bark, deciduous, evergreen, hardwoods, soft woods, juniper.
Plants	chlorophyll, photosynthesis, stamen, petals, phloem, pistil, roothairs, roottips, buds, flower.

Activity 5 - Field

Studying animals and their language. This could be included in a unit on the language of animals. This could be just one phase of animal study.

Call in an expert. For example, a bird watcher and let him explain how to identify birds and their habits.

ACTIVITY PROCEDURES

ACTIVITIES IN THE FIELD, SITE 7

Activity 1 - Comparing and Contrasting Our Descriptions

With a large group, you can divide into four smaller groups. One group with headphones on, the second with blindfolds, the third group with both headphones and blindfolds, and the fourth as a control group, having all their senses exposed.

Have each group choose a leader and that leader will turn on a tape recorder for each group. Gather together after each group has completed their experience and let them listen to what has been gathered. Have each child sit in the field using all their senses and compare and contrast the differences found from the two experiences. Have them write a descriptive paragraph.

Activity 2 - Listening to Sounds

Take the class to several different "listening" places. Have them describe the sounds they hear. Make a comparison of sounds which are pleasant and which are unpleasant (noise). What causes the sounds? Can anything be done to correct the noise (polluted sounds)? Why are the sounds pleasant and unpleasant? What can be done at home to take care of the noise? Where do they think it is best to run and shout?

ACTIVITIES FROM ENTRANCE TO PARK TO INDIAN CAVE, SITES A-1

Activity 3 - Blind Walk

This activity can be done with a student leading another or a teacher leading a group using a rope. Have students be aware of the feelings they get from not being able to see where they are going.

At the end of the walk, have the students evaluate their feelings and emotions. How does it feel to be blind? How does it feel to have to depend on another to lead you around?

Gather in a circle after your walk. Record all the sounds heard, things touched, things smelled, time and distance covered. Let students decide what type of composition they would like to write, keeping in mind that particular type of disability.

POST ACTIVITIES

Activity 1 - Comparing and Contrasting Our Descriptions

Help a handicapped student in school. Visit a special class for the handicapped. Decide on how you, as an individual, can help the handicapped person.

Activity 2 - Listening to Sounds

Make a poster containing pictures of what was heard. Make a film and record noise. Show the finished product to the rest of the school. Help them be aware of what is happening to our environment and what they can do to correct it. Write letters to the company concerned telling them what was found.

Activity 3 - Blind Walk

Make a poster in braille. Blindfold students and have them do a project and when through, see their results.

Activity 4 - Brainstorming

Gather as many specimens as possible dealing with our vocabulary words from our trip to the forest. Have each child make a book with the word, sample and a description written by the student.

Activity 5 - Field

Visit a bird sanctuary and see how many species of birds are the same as we found on our trip to Jacobsburg State Park.

Activity 4 - Brainstorming

Have the students use some of these words in a sentence (use of words would require dictionary work, if the students did not know them). Allow the students to select a word, develop a theme centered around environmental problems. Allow the students to select another word to develop a theme showing man's relationship with his environment.

Many ideas and concepts develop from these students' writings. The writings could then be shared with the class by allowing the students to read their papers orally and discuss the concepts presented. Have students read poems and stories using some of the words listed.

Note: Do this for all seasons as each topic would change from season to season.

ACTIVITIES FOR MAIN TRAIL, SITES A-B

Activity 5 - Field

Take students on a field trip to Jacobsburg State Park. Divide your class into groups of five (5) students each. Each group should have a group leader. Allow the students to sit down along various areas of the main trail (see map A-B), to record the sounds of the forest or field. Listening activities should not necessarily be limited to bird calls, but sounds of other animals and other outdoor sounds. In the classroom, this tape can be played and, at the same time, pictures of corresponding animals displayed and discussed.

Allow the students to write a theme or a poem about the sounds heard. Take your students into the city to compare the sounds and the producers of these sounds. Play for your students LP records or find other prose or poetry written that may describe your reactions.

EXTENSIONS

Language Arts must establish a working relationship with all other subject areas.

Suggestions to be used

1. Articles for school newspaper (Photo-Art Department).
2. Feature for local newspaper (Photo-Art Department).
3. Programs for local radio stations and also educational TV (Channel 39).
4. Talks and reports for community groups (Tape with filmstrip).
5. Historical narrative (Tape with filmstrip).
6. Enlisting the help of community and civic organizations resource agencies and others through a continuing informative program that includes talks, slide shows, exhibits and news coverage.
7. Invite senior citizens to participate in the field trips to the park to gain their personal history.
8. Surveys that are related with ecological problems that might affect the community common good.
9. Keep a field notebook and record observations.
10. Pamphlets for community.
11. Creative writings (poems) that are later set to music.

OTHER CURRICULUM AREAS

Art	From senses - activities involving form and texture.
Science	Experience terms (seasonal) listed under Activity 4 under soil, water, forests and plants.
History	Imagine you are an American Indian walking through the sites. How would the area appear to you? What would your feelings and experiences be?
Nature	Use tape recorder to make your own "bird call" record, or record other environmental sounds.

Language Art

Robert Hilyard
Grade 10

CONCEPTUAL THEME

The names of forest plants and animals can be used by students to construct word puzzles that increase vocabulary skills.

OBJECTIVES

Upon completion of this activity, students will be able to:

1. Name some of the more common woodland plants and animals.
2. Be familiar with the use of the dictionary.
3. Be familiar with the use of nature guides.
4. Be able to use a thesaurus.
5. Construct word puzzles.
6. Solve word puzzles made by other students.
7. Show some improvement in vocabulary and spelling skills.

Equipment and Materials

Pocket dictionary
Roget's Thesaurus
Nature guides for identification

Clip board
Pencils
Paper
Examples of word puzzles

PRE-ACTIVITIES

Students will be given a puzzle worksheet at the wooded site. Students should be able to determine by cooperative effort what trees and plants are described. After naming the tree or plant, the student should find an example in the area and write the proper spelling on the answer sheet.

ACTIVITY PROCEDURES

Other examples of puzzles will be given to the students. Each student should make a word puzzle of his choice about some type of nature item that he determines is in or may be in the site area such as: birds, fish, flowers, insects, mammals, reptiles, rocks and minerals. The proper use of field guides, dictionaries and thesauri should be stressed. Park Site - Site #1 on the area map of Jacobsburg State Park. The area is along the Bushkill Creek by the old bridge. It has examples of flora and fauna of meadow, forest and stream.

WOODLAND WORD HUNT SOLUTIONS

Words in the Woods

1. Black Walnut
2. Eastern Hemlock
3. Staghorn Sumac
4. Black Gum
5. Spice Bush
6. White Pine
7. Red Maples
8. Iron Wood
9. Boxelder
10. Black Locust
11. False Solomon's Seal
12. Poison Ivy
13. Witch Hazel
14. Mushroom
15. Virginia Creeper
16. Wild Carrot
17. Purple Loosestrife
18. Polse Weed
19. Buttercup
20. Skunk Cabbage

Scramble Solution

CARDINAL

KING FISHER

GRACKLE

ORIOLE

GOLD FINCH

FLY CATCHER

Answer - ORNITHOLOGY

Trees in the Forest Solution

Birch
Ash
Plum
Elm
Maple
Yew
Fir
Beech
Apple
Cedar
Larch
Peach
Pear
Cherry
Alder
Mulberry
Fig
Lilac
Red Birch

WORDS IN THE WOODS

The words and phrases listed below when properly identified will indicate the names of some common trees and other plants readily identified in this area. Proper use of your dictionary will help you with some of the words you may now know.

Example - A familiar canine + dense grove of trees larger than a grove and smaller than a forest = dogwood

1. Swarthy + side of a room and slang for an eccentric person. 1.________________________

2. Of the Orient + the last part of a dress that is usually made and the mechanism of a firearm by which the charge is exploded. 2.________________________

3. All male party and brass wind instrument + total and first two letters of a word meaning to suffer a dull persistent pain. 3.________________________

4. Ebony + a sticky plant exudate. 4.________________________

5. Aromatic plant products as (pepper or nutmeg) and rough uncleared country. 5.________________________

6. Albumen + to long for something intensely. 6.________________________

7. A communist + a chart and French word for the plural. 7.________________________

8. Ferrous material + building material made from cellulose. 8.________________________

9. To spar + an older individual. 9.________________________

10. Nocturnal color + destructive migratory grasshopper. 10.________________________

OTHER PLANTS

11. Untrue + Wise King of Israel and a sea mammal.
11.______________________

12. Toxic + Roman Numeral 4 and chemical symbol for Yttrium.
12.______________________

13. Sorceress + light brown as eyes.
13.______________________

14. Cornmeal boiled in water + chamber.
14.______________________

15. State in which first English colony was founded + word used to describe a crawling baby.
15.______________________

16. Uncivilized + automobile and decay.
16.______________________

17. Mauve + lax and war.
17.______________________

18. A quick thrust and a plant of no value.
18.______________________

19. A solid edible emulsion of fat obtained from cream + a small bowl-shaped drinking vessel.
19.______________________

20. Slang for a contemptible person + a taxi and to grow old.
20.______________________

SCRAMBLE

Unscramble these words, one letter to each space, to form the names of six birds you might see at this site.

DANRALIC _ _ _ _ ○ ○ _ _

FERSGNIHKI _ _ _ ○ _ _ _ _ _ _

KRAGLEC _ ○ _ _ _ ○ _

LOREIO ○ _ _ ○ _ _

CODHIFLGN _ ○ _ _ _ _ _ _ ○

CELCAYTRHF _ _ ○ _ _ ○ _ _ _ _

Now unscramble the circled letters to form the surprise answer.

_ _ _ _ _ _ _ _ _ _ _

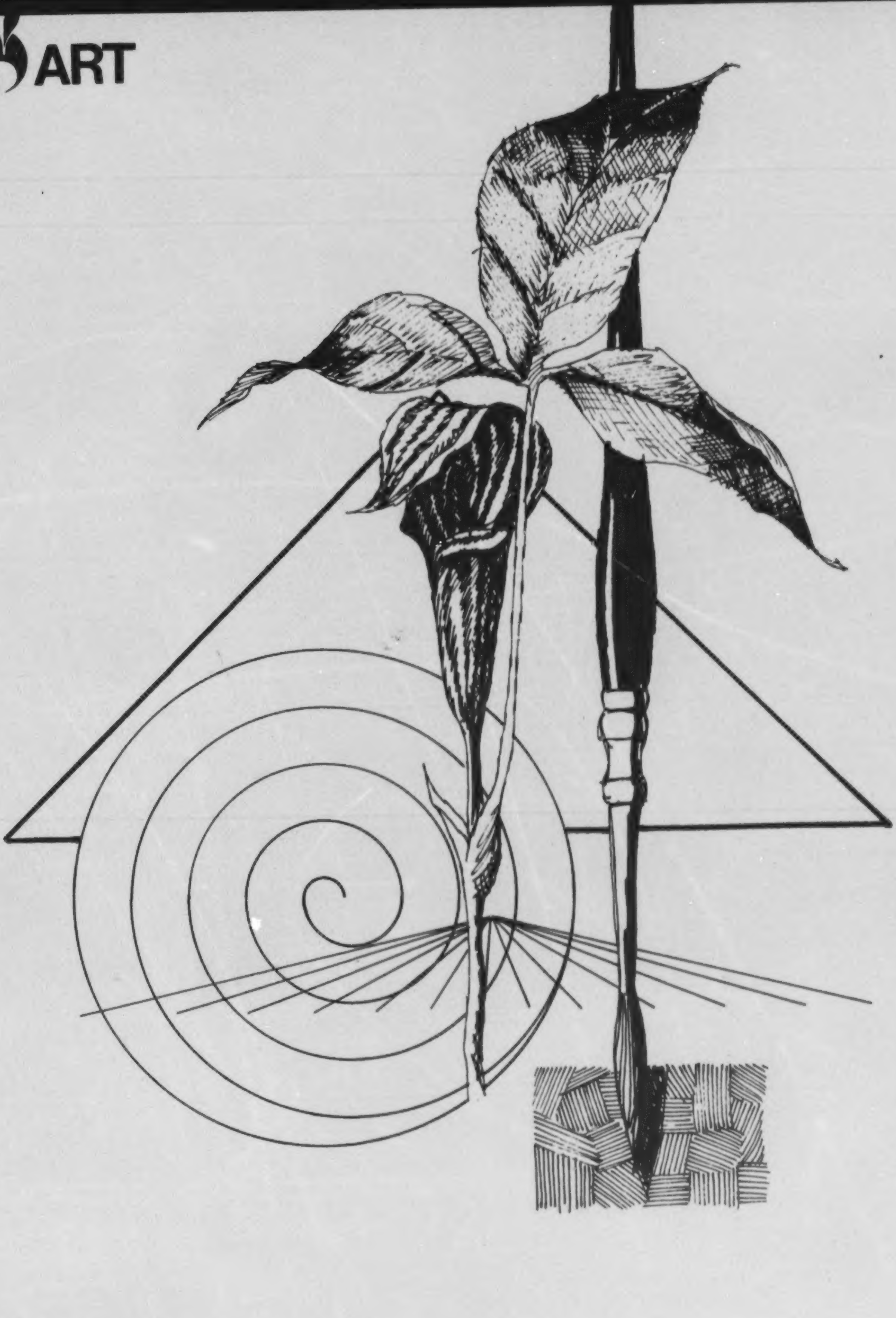
TREES IN THE FOREST-ANAGRAM

This forest puzzle contains more than 20 species of trees. Move in any direction without skipping a letter. Diagonal moves or repeating a letter is permitted.

G	F	Y	E	W
I	R	C	H	M
B	A	E	L	O
L	D	B	P	U
I	H	S	A	M

Example - Begin with the M in the lower right hand corner and spell maple. List all of the trees you can find.

MAPLE



Helen Irvine

Art and Trees

This unit consists of four modules. Each may be taught separately or inter-related to develop a total awareness of the beauty of trees.

The modules are:

1. Sensory Approach
2. Developmental Approach to Awareness of Texture
3. Developmental Approach to Awareness of Line and Shape
4. Developmental Approach to Color

This unit may be modified to meet the needs of any elementary age child.

Bibliography

North American Trees. Richard J. Preston, Jr. The M.I.T. Press. Cambridge, Mass.

A Sensory and Conceptual Approach to Ecological Involvement. Steve VanMatre. American Camping Association. Bradford Woods, Martinsville, Indiana.

Examining Your Environment. J. C. MacBean, A. Strecher, D. F. Wentworth, J. K. Couchman. Holt, Rinehard and Winston. Toronto, Montreal.

Common Trees of Pennsylvania. Commonwealth of Pennsylvania, Department of Environmental Resources, Harrisburg, Penna.

Scamper. Robert F. Eberle, D.O.K. Publishers, Inc. 771 East Delever Avenue, Buffalo, New York

Developing Creativity in Children. Charles E. Schaefer, D. O. K. Publishers, Inc. Buffalo, New York

Learning About Nature Through Games. National Recreation and Park Association. Virginia W. Musselman. Stackpole Books. Harrisburg, Penna.

#432 Experience in Expressing Texture, #433 Shapes and Patterns, #402 Observing with Senses. Nolde Forest, Reading, Penna.

Art

Helen Irvine
Grades 2 through 6

Texture

OBJECTIVES

1. To reinforce the concept of texture

2. To develop an awareness of texture in trees

CONCEPTS

1. An awareness of texture in trees enables one to appreciate more fully the beauty of trees.

2. An awareness of texture in trees is important in learning how trees may be identified.

PROCEDURE (Suggested activities prior to the trip to Jacobsburg)

1. These activities may be used to increase the child's understanding of texture.

   A. Children feel objects in the classroom and in the outdoor area around the school.

   B. Children make texture rubbings of objects in the classroom and in the outdoor area around the school. Rub pencil or crayon over a sheet of paper placed over an object.

   C. Children and the teacher discuss objects they have felt and define them as smooth or rough. Relate their findings to other common objects.

   D. Show colored slides or pictures of trees common in the Park Area which would have different bark and leaf textures. Some questions that may be asked are:

      (1) What parts of the tree might you touch to feel differences in texture?
      (2) What texture do you think you would feel in the leaves?
      (3) What texture do you think you would feel when you touch the bark of the tree?

   E. Take children outdoors to experience feeling texture in trees around the school.

Equipment and Materials

Box of crayons	Clay
Manilla paper	Clipboard or file folder
Soft pencil	

ACTIVITY PROCEDURE

1. Children walk on the main path past the Hemlock Forest to the road and up to the Henry Estate.

2. Children do texture rubbings of bark from trees in the Park and on the Henry Estate.

3. Children do texture rubbings of leaves (find leaves on the ground and return them to the ground; nothing is to be removed from the Park)

4. Teach children that clay is a natural resource. Show them a clay bank at the site right off the main path.

5. Children use a portion of the clay to make imprints from the bark of trees.

As children walk through the forest and stop at various trees, ask questions similar to those asked before the trip.

POST ACTIVITIES

1. Make a collage from leaf and bark prints.

2. Refine clay imprint to form plaque or paper weight, etc.

OTHER CURRICULUM AREAS

Nature

Tree identification may be incorporated in this lesson. The most common trees found in the forest are hemlock, maple, oak and tulip.

History

An interesting point may be related to the use of bark of hemlock. Tanneries were built near hemlock forests because the bark was used to tan hides.

Helen Irvine
Grades 2 through 6

Color

OBJECTIVE

To develop an awareness of the beauty of the color of trees.

CONCEPT

1. Being aware of color in trees enables one to appreciate more fully the beauty of trees.
2. Being aware of differences in fall coloration is an aid to tree identification.

PROCEDURE (Suggested activities prior to the trip)

1. Discussion of primary and secondary colors.
2. Children make a color chart.
3. Name different colored objects in the room.
4. Search for different colors outdoors (near school).
5. Show black and white and colored pictures of trees and forests to develop awareness of how important color is in nature.
6. Show slides to illustrate differences in color of man-made objects to colors in nature.

Equipment and Materials

Pad for sketching
Soft pencil
Color charts
Crayons

ACTIVITY PROCEDURES

1. Observe and compare color in trees.
2. Thumbnail sketches of trees.
3. Rough coloration of trees using crayons.

POST ACTIVITIES

1. Refine sketches
2. Crayon resist - color paper with different colors pressing heavily with crayons. Cover with black crayon. Using blunt scissors, draw free hand leaf designs on paper.
3. Discuss cool colors (conifer trees) and warm colors (deciduous trees).

OTHER CURRICULUM AREAS

Nature

Tree identification may be incorporated in this module.

Tree coloration as an aid in protecting wildlife.

Art

Helen Irvine
Grades 2 through 6

Sensory Approach

OBJECTIVE

To develop a heightened awareness of the beauty of trees through the use of the senses of hearing, touch, smell and sight.

CONCEPTS

1. An important function of trees is to provide aesthetic value to man.
2. The senses of hearing, touch, smell and sight are important in experiencing the beauty of a forest.

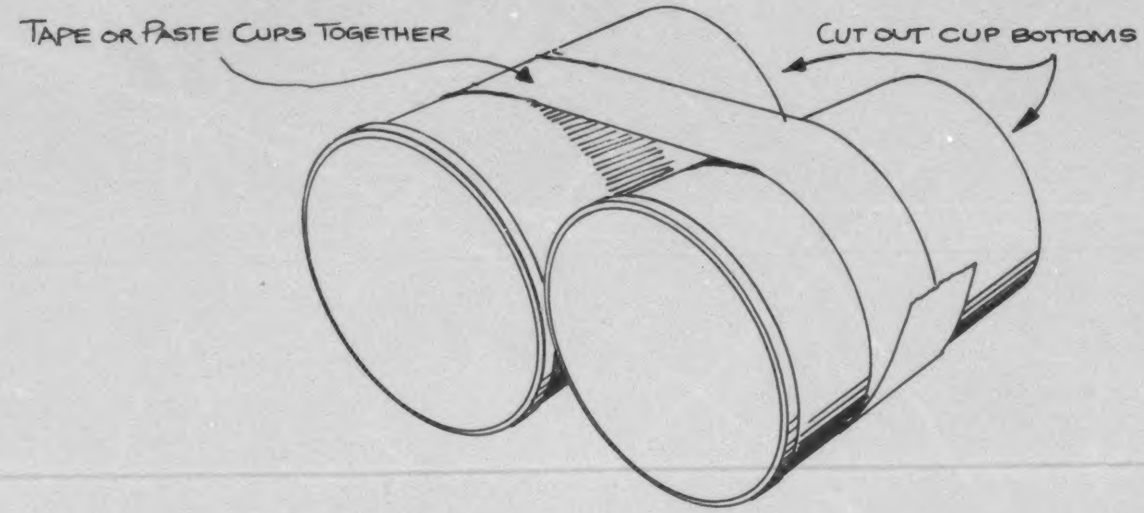
PROCEDURE (Suggested activities prior to the trip)

1. Discuss briefly the five senses.
2. Blindfold children in the classroom (when cutting off one sense, the others are more acute) or blindfold children on the playground. Direct them to feel objects around them, smell the air and listen for sounds. Tell them to be aware and remember what they smelled, heard and felt. Remove blindfolds and discuss their experiences.
3. Children may illustrate their sensory experiences.
4. Show pictures of trees taken at Jacobsburg State Park.
5. Show and discuss slides or pictures of the beautiful and not so beautiful such as a forest before and after a fire, a forest uncluttered and cluttered with trash, trees in a city (exposed to air pollution) and trees in the country.

Equipment and Materials

Blindfolds
Clipboards
Sketching paper
Crayons
Soft pencils
*Homemade binoculars

*After cutting out the bottoms of two paper cups, paste them together.



ACTIVITY PROCEDURE

1. Walk on the main path to the Hemlock Forest.

2. Direct the children to sit in a circle in the forest and look around.

3. Blindfold the children and suggest that they feel the ground, smell the ground and the air and be very quiet as they listen to the sounds in the forest.

4. After five or ten minutes, ask questions such as:

    A. What are you thinking about?
    B. What did you smell?
    C. What sounds did you hear?
    D. What did the ground and air feel like?

5. Remove blindfolds and after their eyes have had time to adjust, direct them to lie on their backs and look up through the trees. Ask them what they see and how they feel.

6. Children may jot down or illustrate their impressions.

7. Continue walking through the forest stopping to look at different trees through homemade binoculars (to block out the area they do not wish to focus on). By limiting the field of vision, the binoculars force the user to become sensitive to details.

POST ACTIVITIES

1. Exchange experiences.
2. Draw pictures about the sensory experiences that were most impressive.
3. Possible questions might include:
    - A. What was most pleasing to you about our visit?
    - B. Was it something you heard? Draw a picture about it.
    - C. Was it a feeling you had or something you thought about while you were lying in the forest? Draw this.
    - D. Was it an especially beautiful tree? Draw this.

    Use your imagination. It is not necessary to draw something real.

OTHER CURRICULUM AREAS

Language Art

Creative writing or poetry

Music

Comparison of forest sounds with urban sounds

Comparison of forest sounds with sounds of musical instruments. Use tape recorder.

Dance

To express feelings experienced in the forest. Illustrate motion of trees.

Helen Irvine
Grades 2 through 6

Line and Shape

OBJECTIVES

1. To reinforce the concept of line and shape.
2. To develop an awareness of line and shape in trees.

CONCEPTS

1. Being aware of line and shape in trees enables one to appreciate more fully the beauty of trees.
2. Being aware of line and shape in trees is important in learning how trees may be identified.

PROCEDURE (Suggested activities prior to the trip)

These activities may be used to increase the child's understanding of line and shape.

1. Ask what a line is. Children draw lines. Ask what a shape is. Children draw as many different shapes as they can.
2. Teacher will draw circles, ovals, rectangles, squares, triangles on board to review geometric shapes.
3. Children may observe objects in the room, feel objects shared with each other, draw objects they have seen and felt.
4. Discuss their observations relating what they have discovered to geometric shapes on the board.
5. Take children outside to observe line and shape in nature.
6. Show pictures of trees common in Jacobsburg State Park.
7. Children draw objects that illustrate geometric lines and shapes. (trees - triangle; branch - curved line; leaf - oval; petal - oval; etc.)
8. Children do line drawing with water color on wet paper (Use branch of tree or plant as a model).
9. Children do yarn drawings of objects.

Equipment and Materials

Manilla paper
Colored chalk
Crayons
Soft pencils
Heavy watercolor paper
Clipboard

ACTIVITY PROCEDURES

1. The walk will start on the main path past the Hemlock Forest, on to the road, and up to the Henry Estate.

2. Lead children to observe line and shape in extended roots as well as trunks, branches, and leaves. (Good examples of extending roots are along creek bank in the fireplace grove.)

3. Suggested activities may include:

   A. Thumbnail sketch of trees (thumbnail sketch is a rough sketch) Use homemade binoculars to focus sight on one area.

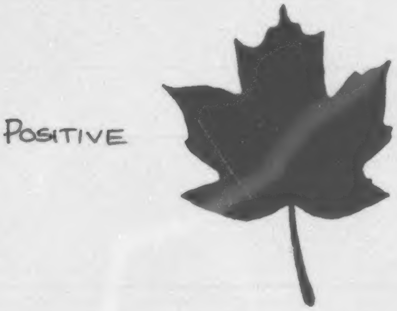
   B. Leaf rubbings - Pick up leaves and return to the ground; nothing is to be removed from the Park.

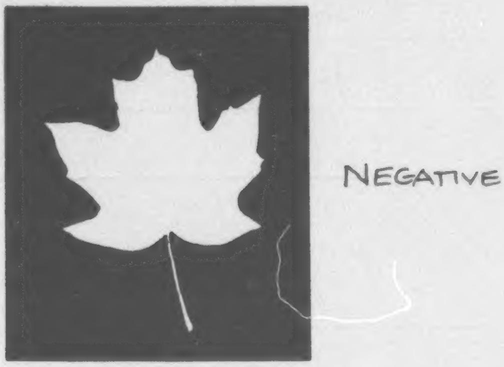
   C. Colored chalk on wet paper - Dip heavy watercolor in creek and sketch tree using colored chalk (to give feeling of line).

   D. Texture rubbing of tree stump (concentric circles indicate age of tree) This will be a good example of line and shape. A good stump is at the Henry Estate.

POST ACTIVITIES

1. Positive-Negative using leaf patterns that were traced from leaves at the Park. Place folded edge of leaf pattern on folded edge of paper, trace and cut out leaf. (Leaf is positive; pattern formed is negative)





2. Use these leaves, texture rubbings of bark and yarn to make a collage.

3. Mobile using hanger, leaves and yarn.

4. Foil print - Place a leaf between aluminum foil and newspaper and roll with a glass or rolling pin.

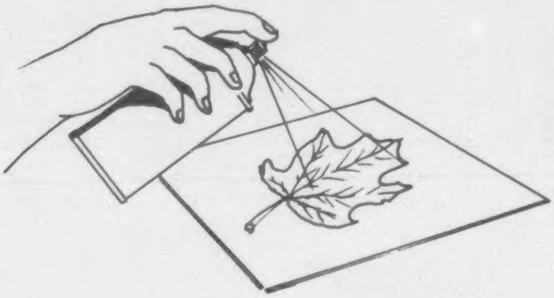
5. Crayon resist - Colored paper with different colors pressing heavily with crayons. Color over this with black crayon. Using blunt scissors, draw leaf designs on this paper.

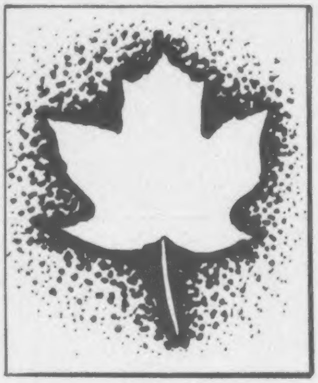
6. Refine thumbnail sketches.

7. Leaf rubbings - Decorate napkins or stationery.

8. Family tree - Children draw roots (grandparents), trunk (parents), branches (themselves). Concept of growth of tree compared to growth of family.

9. Spatter print - Place leaves on paper and spatter paint through a screen or use spray paint. Area around leaf will be painted.





OTHER CURRICULUM AREAS

Nature

Tree identification

Math

Observation of sets, geometric shapes, measurement of height, diameter of the trunk, etc.

Determination of the age of a tree using concentric circles. (Stump is on the Henry Estate)

Science

Why are trees formed the way they are?

What do the line patterns serve as?

Elizabeth Burak

Nature's Patterns

CONCEPTUAL THEME

Many different shapes and patterns exist in nature - in plants, animals and non-living things.

OBJECTIVES

Upon completion of this activity, students will be able to:

1. Appreciate the variety of patterns and shapes in nature.
2. Sharpen techniques of observation in the environment (natural or man-made) in order to see "parts of the whole" as well as the "whole".
3. Develop a realization that there exist just a few basic shapes which in nature are repeated to form new patterns.
4. Reinforce the study of shape in mathematics including plane and solid figures.
5. Develop the realization that man has used nature's patterns to develop his own artificial environment.

Equipment and Materials

Pencils
Cardboards (to use as writing surface)
Binoculars and magnifying glasses (for every 5 children)

PRE-ACTIVITY

1. Children should be equipped with a small piece of paper and pencil on which to make a few jots. The teacher would present a slide show on nature scenes: slides showing "wholes" and "parts of wholes". The children should, as they are watching, jot down as many shapes as they see; then review the slide show slowly having students point out the shapes and patterns. In this way, elicit the list of shapes seen and discuss each. These should include such shapes as spiral, triangle, radial, circle, dendritic, pentagon, hexagon, concentric circles or any other shapes one would wish to include or exclude.

2. Examine the log sheet each child will use to record his observations on the field trip. One like Appendix A should be used. Entries in the log sheet can either be written or drawn or both.

ACTIVITY PROCEDURE

It is advisable to give children a limited area in which to work. In addition, limit the time spent observing. If you wish, children might walk along a main trail to observe.

Some examples of things that may be found to fit each of the shapes are:

Spiral - pine cone, a falling maple seed, tendrils of vines, snail.

Triangle - wings of some insects, fins of fish, clusters of bubbles in the stream.

Radial - pine needles, spider webs, daisies

Dendritic - branches on trees and bushes, the stream, veins in leaves.

POST ACTIVITY

Proceed in a similar way now with a neighborhood walk as was done at the park. Use log sheet (appendix B). Children should observe the basic patterns of nature in the man-made environment. Following this experience, another discussion would ensue. Construct a bulletin board comparing and contrasting the natural vs. man-made shapes, patterns and objects.

OTHER CURRICULUM AREAS

Math

Follow-up activity with possible math lesson on plane and solid figures as related to those shapes observed. Drawing, as well as construction of these shapes or patterns could be done. The constructed patterns could then be combined in a free form sculpture or a mobile.

Language Art

Have students discuss and share their observations. If anyone found examples of other patterns, discuss them and find out what they are called. A list of the observed patterns or a bulletin board display could follow.

Nature

Further patterns can be studied using the longitudinal views vs. the cross-section view.

"Things that look one way on the outside usually reveal completely different designs or patterns, if they are cut in half. If a tree is cut across, you see a pattern of circles. This view shows what are called the rings of a tree. If the tree is cut the long way, you would see a pattern of long lines. This view shows what is called the grain of the wood." Using this idea, the following items can be used:

apple
orange
dandelion

cabbage
twig
anthill

If there is more than one way at which to look at something, draw all the ways.

APPENDIX A

EXAMPLES OF PATTERNS I'VE FOUND IN NATURE

PATTERN	EXAMPLE ONE	EXAMPLE TWO	EXAMPLE THREE
Spiral ◎			
Triangle △			
Radial ✳			
Circle ○			
Hexagon ⬡			
Pentagon ⬠			
Dendritic			

APPENDIX B

EXAMPLES OF PATTERNS I'VE FOUND IN A MAN-MADE ENVIRONMENT

PATTERN	EXAMPLE ONE	EXAMPLE TWO	EXAMPLE THREE
Spiral ◎			
Triangle △			
Radial ✳			
Circle ○			
Hexagon ⬡			
Pentagon ⬠			
Dendritic			

Art

Experimenting in Natural Colors

CONCEPTUAL THEME

Nature provides sources of color for man's use.

OBJECTIVES

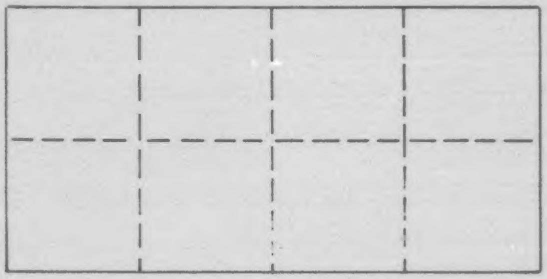
Upon completion of this activity, students will be able to:

1. Become aware of the many colors that can be made using natural things that can be found in the state park.
2. Become aware of the variety of objects found in the state park - types of soil, rocks, trees, berries, flowers and other vegetation.
3. Understand the differences between such categories as living and non-living and green and non-green.
4. Become aware of the historical significance of natural colors - uses by early inhabitants in dying.

Equipment and Materials

Pencils
Cardboards to act as drawing boards
12" x 18" white drawing paper

Section drawing paper by folding into 8 sections as follows:



PRE-ACTIVITIES

1. Discuss and elicit from the children those items in the classroom that would produce color. Are these natural or man-made things? If man-made, from what natural things are these made?

2. A neighborhood walk could be taken then with the purpose to locate natural things which are capable of producing various colors. The children may, with teacher supervision, collect one or two things each to bring back to the classroom.

3. Have the children present what they collected. Categorize these producing a list the students could use while out in the field, including soils, leaves, berries, flowers, rocks, mosses, etc.

4. On a large sheet of drawing paper, the class could then use what they brought back to produce a class collage of rubbings.

5. A discussion of the colors produced from each student's rubbings would lead us to a discussion of living and non-living and green and non-green materials, if so desired.

6. A short discussion of man's role as steward or custodian of the environment vs. his role as consumer could then be carried on. Caution them to use nature's things carefully and in limitation. Pick one leaf rather than a group, one flower petal rather than the whole flower, one berry rather than a whole bunch, etc. Return whatever is picked to the earth.

ACTIVITY PROCEDURES

Equip each child or a small group with the materials necessary. The sectioning of the paper is suggested to help the students better organize. However, the activity structure can be revised in many ways according to the teacher's wishes. The children could collect a certain number of color rubbings or be allotted a certain time period. It might be advisable to limit the area to be used. If the teacher wishes to reinforce the categories of living and non-living, green and non-green, the drawing paper can be folded in half to organize the rubbings in that way. The labeling need not be specific to the point of identifying the objects. Simple labels will be sufficient.

POST ACTIVITY

Display the rubbings. The colors can be linked by sketching to the item from which it was extracted. For instance, a sketch of the Queen Anne's Lace flower could accompany the rubbing of the purple flower in its center.

OTHER CURRICULUM AREAS

Language Art

Share the students' rubbings. Discuss similarities and differences.

History

Discuss the uses of these natural dyes in our early history.

Nature

Conduct a nature hunt for specific items found in your area. Then have children dye squares of material using some of these material dyes found near, around or in the students' homes.

Math

The dyed squares can be stitched together, producing a patchwork wall-hang. Before joining, children could decorate each square using crewel embroidery or some type of applique work. The final patchwork design can be planned using graph paper utilizing math skills (scale, use of ruler) as well as attention to the pattern and color of each cloth piece.

TEACHER REFERENCE INFORMATION

Suggested natural dyes which are easily obtained from many vegetables, fruits and trees:

Yellow - onion skins, goldenrod, pear leaves, sumac roots, celandine, tanglewood stems, citron.

Red - onion skins, raspberries, bloodroot, beets, strawberries.

Purple, Violet - beets, pokeweed berries, dandelion roots.

Blue - larkspur flowers, blackberries.

Orange - mountain ash berries.

Brown - walnut hulls, butternut bark, sumac bark.

Pink - sassafras roots

Suggested references for dyeing:

Adrosko, Rita J. *Natural Dyes in the United States*, United States National Museum Bulletin 281, Smithsonian Institution Press, Washington D. C., 1968. Includes notes on history and dye processes.

Brooklyn Botanical Garden. *Dye Plants and Dyeing*. Brooklyn Botanical Gardens, 1000 Washington Ave., Brooklyn, New York, 11225. Includes plants from throughout the world.

Home Dyeing with Natural Dyes, U. S. Department of Agriculture. Misc. Publ., Washington, D. C., 1935.

Examples of Color Rubbings made at Jacobsburg State Park

1. Soil found near the stream

2. Charred wood

3. Leaf

4. Moss

5. Red Berry

6. Soil under hemlock trees

7. Center of the Queen Anne's Lace flower

8. Blueberry

Effect of Man on the Environment

CONCEPTUAL THEME

Man can affect the beauty of nature.

OBJECTIVES

Upon completion of this activity, students will be able to:

1. Become aware of the natural beauty which exists in our country.
2. Become aware of the detrimental effects of man on the environment.
3. Become aware of the beneficial effects of man on the environment.
4. Become familiar with the words and music of "American, the Beautiful".

Equipment and Materials

Magazines containing colored pictures
Clear contac paper
Ruler
Scissors
Soapy solution
Dishpan
Cardboard frames for mounting

ACTIVITY PROCEDURE

This activity would seem to be used best as a follow-up to a unit. It would also seem using it as a class or group project would be most beneficial.

Begin by listening to and discussing the lyrics of the song, "America, the Beautiful". Discuss and make a list of possible pictures that would fit for each phrase showing the beauties of nature. Then discuss and make a list of possible scenes which might show the contrasting view of the ugliness of man's effect on his environment. Allow the children time to collect both sets of pictures from the magazines. Make a final selection setting up the sequence.

Colorlift each picture using the contac paper, mount them on cardboard frames. Number the transparencies in order, interspersing the beautiful and the ugly referring to each line of the song.

The transparency show could be presented at an assembly or group gathering accompanied by the music and lyrics of the song "America, the Beautiful". It is possible that such a show could be used as a springboard to a discussion about the effects man has had on the environment in the local area.

Other possible studies include:

1. Photograph or slide presentation
2. Architecture which has been assimilated into the environment, such as those buildings of Frank Lloyd Wright.

Art

Irene Anthony
Grades 5-6-7

CONCEPTUAL THEME

Colors are an exciting part of anyone's environment.

OBJECTIVES

Upon completion of this activity, students should realize that:

1. A great deal of enjoyment is added to our lives if we remember often to notice the colors in nature.
2. Colors tell us what season it is.
3. Color also tells us the conditions of our environment.
4. Color has a very definite effect on the way we feel and act.

Equipment and Materials

Pencils
Papers for charts

PRE-ACTIVITIES

1. Discussion of color.
    - A. Can you imagine a world without color? (Expression of thought and ideas would be affected, communication would be affected.)
    - B. Effects of feelings (on you and your moods).
2. Discuss favorite colors.
3. List the things you observed from the window which are designed in your favorite color.
4. Take a walk and notice the color of man-made objects.

	Objects	Color Present
1.	Car	Two-tone green
2.		
3.		

ACTIVITY PROCEDURES

Make a chart

	Flowers	Animal	Bird	Color	What the Color Does
1.		rabbit		brown	blends in with environment for protection
2.					

POST ACTIVITIES

1. Compare the two charts - the one man-made to the one from Jacobsburg State Park. Are the things you like best in the color you like best?
2. Work up an art unit on advertising letting the students design and make up their own product.

OTHER CURRICULUM AREAS

Science

Different colors for different seasons.

Different colors for animal protection.

Study the condition of the environment by noting the color.

Art

Irene Anthony
Grades 5-6-7-8

CONCEPTUAL THEME

Color can be used in camouflage and/or adaptation.

OBJECTIVES

Upon completion of this activity, students will be able to know:

1. An adaptation is defined as any property of an organism that helps it to live in its environment.
2. Female birds are more likely to need protective coloration than the male bird because she must protect her eggs in the nest.
3. How to investigate the effectiveness of various concealment factors (color) in helping animals to be inconspicuous in their surroundings.
4. This natural adaptation is a result of the inherited traits that the animals possess.

Equipment and Materials

Slides showing camouflage in color
Transparencies showing camouflage in color

PRE-ACTIVITIES

1. Show slides and transparencies.
2. Have the children find the animals that are camouflaged in the slides and transparencies.
3. Ask the class to identify the properties that provide concealment for each animal.
4. Explain the examples illustrating that concealment may be due to a number of factors - the animal's shape, texture and/or combination of coloring and shading.

5. Use a chameleon as an example.
    - A. What color is it?
    - B. Does it change color? Why?
    - C. What might happen if it didn't have these properties?
6. Discuss female birds vs. male as far as coloration is concerned.
    - A. Female sits on nest - plain colored feathers provide effective concealment while she sits, vulnerable on her nest.
    - B. Coloration needed for types of nest. Example - Pheasant nests on ground. Therefore, female has dark coloration.

Equipment and Materials (For Activity)

Crayons or colored pencils
6 x 8 file cards

ACTIVITY PROCEDURES

1. Have children on their walk through the park find examples of camouflage.
2. Have the children draw 2 or 3 organisms somewhere on the card.
3. Fill in the background that will make the organism hidden.
4. Encourage them to experiment with various combinations of color, shape and pattern to create effective camouflage.
5. Don't let anyone see your finished product.
6. Put name on back of cards and pass them in to the teacher.

POST ACTIVITIES

1. Scramble the cards from the field trip.
2. Display them all along one side of the room.
3. Assemble everyone on the opposite side of the room.
4. Starting with the picture on the left, ask any student if he is able to identify the animal, insect or bird and describe its general location on the card. Example - bottom right hand corner.
5. If found, eliminate that card.
6. Each student should refrain from identifying his own cards.
7. After every student has made a guess and some cards still remain, take a step closer and proceed to do it again.
8. Continue this until only one card remains. This person could then become the camouflage champ.

OTHER CURRICULUM AREAS

Science

Study of animal habitat

Relation of plant and animal life

Art

Irene Anthony
Grades 5-6-7-8

CONCEPTUAL THEME

A definite pattern is formed by animal tracks.

OBJECTIVE

Upon completion of this activity, students will be able to identify at least five animal tracks.

Equipment and Materials

- Paper cups
- Plaster of Paris
- Water
- Spoon
- Paint brush

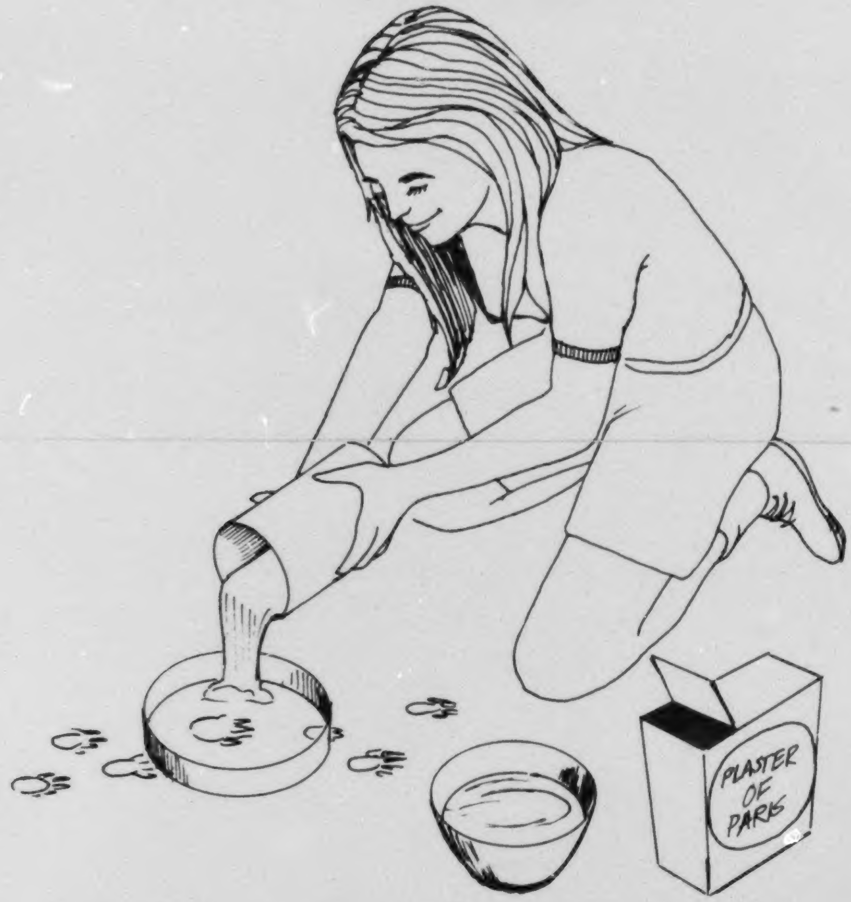
PRE-ACTIVITIES

1. Show slides or pictures of different animal tracks. A good source is Special Circular #151 published by the Pennsylvania State College of Agriculture Extension Service.
2. Have a small group of children prepare a plot of land that is bare of grass by softening it with water.
3. Have two children walking from opposite directions stop and talk.
4. Have children make a plaster of paris of these tracks.

ACTIVITY PROCEDURES

1. Find animal tracks. A good spot at Jacobsburg State Park is along the bank of a creek. This is found along the main path, going past "Indian Rock" and looking on the left side of the road.
2. Select any open area where the land is soft and muddy.
3. A list of animal tracks that could be found in Jacobsburg State Park are:

   A. Squirrels
   B. Mice
   C. Rabbits
   D. Skunks
   E. Raccoons
   F. Birds - Pheasants



4. Place a circle around the traces. This can be done with the paper cup - cut off 2" from the top of the cup.

5. Mix the plaster of paris with water to get a thick, creamy consistency. This will keep the mixture from spreading too far.

6. Carefully pour the mixture into the circle and completely cover it.

7. Wait half an hour or an hour for mixture to cool and harden.

8. Very gently, lift the casting and carefully clean with brush. This is a negative cast.

POST ACTIVITIES

1. To make a positive cast, coat negative cast with vaseline and repeat the casting process. Put a small hole in top of positive cast.
2. Separate the two parts carefully.
3. The student can now paint the cast, shellac it, and put a ribbon or chain through the hole.
4. Another project is to use the cast as a paper weight.
5. The Industrial Arts students could also make a wall plaque. Sand a piece of wood, shellac it, center the cast on wood and glue.

OTHER CURRICULUM AREAS

Math

Measure tracks

Science

Animal habitat and activities of animals by studying tracks and location.

Language Art

Writing activity - Why were they made? Where were they going? What happened to them?

Art

Irene Anthony
Grades 5 through 10

CONCEPTUAL THEME

Experience in color

OBJECTIVES

Upon completion of this activity, students will be able to:

1. Learn the different colors, shades and blendings through the study of mushrooms and lichens.
2. Become aware of the wealth of nature as a source of material for art expressions.
3. Increase skills in the handling of materials and tools.
4. Help form self-evaluation.
5. Understand that bright, beautiful colors do not necessarily indicate goodness and benevolence.
6. Understand that blending of color can be obtained by applying one larger over the other. Example - brackets or shelf fungi on tree trunks.
7. Know that fungi or mushrooms are to be used only by one sense - that of sight - do not taste, feel, or smell.
8. Find in nature the sources of such art principles as unity and balance, rhythm and proportion.
9. Grow in the appreciation of beauty in nature.
10. Know that the safest mushrooms are those in the grocery store.

Equipment and Materials

A clipboard or cardboard to be used as drawing board
Two pieces of white construction paper
Box of 48 crayons with different shades
Paint box with 8 colors so they must blend colors
Chalk
*Mushrooms of the World by Lucuis VonFrieden
Hand lens

*This is a very good book because it shows a color plate of each type of mushroom. The corresponding page is a description of its parts and uses.

PRE-ACTIVITIES

1. In showing slides and transparencies, pick out different colors - stressing primary and secondary colors.
2. Look for colors that blend together.
3. Experiment with crayons showing different effects they can acquire.
    - A. The use of the point of the crayon for short, even lines.
    - B. The use of the side of the crayon for broad, wide lines.
    - C. Apply the crayon with parallel strokes in the same direction to achieve even tones.
    - D. Apply the crayon as above but then apply in the opposite direction. This will give you a darker tone.
4. Experiment in chalk.
    - A. Vary the pressure on the chalk to gain different shades.
    - B. Rub with cotton, sponge and paper towel or tissue to obtain a blending in color.
5. Experiment with water color.
    - A. To achieve a solid color, use a full brush.
    - B. To get a striped effect, separate the brush into two parts.
    - C. Children will need practice in learning how to blend colors.
    - D. Practice will also be needed so they will learn not to let the colors run together.
6. Let the students pick which media he or she would like to experiment in.

ACTIVITY PROCEDURES

1. Look for mushrooms along the main path.
2. Ask questions and discuss.
3. Sketch it first in a white or plain color until you are happy with its shape.
4. Fill the sketch in with the correct color, trying to match it as closely to the real color of the mushroom.
5. Continue doing this until you have a variety of art work.

POST ACTIVITIES

1. Have another lesson back at school by reproducing their best mushroom in paper mache.
2. If you or the children have a terrarium, you might place them in a natural surrounding.
3. Make a mobile. Cut out the mushroom, pick out the most predominant color of each mushroom and paste on a cardboard backing in this color.

OTHER CURRICULUM AREAS

Science

The study of mushrooms - comparison of good and bad - edible or deadly.

Type of environment needed to grow mushrooms.

Language Art

Write an imaginary story about fairies and mushrooms.

Irene Anthony
Grades 7 through 12

CONCEPTUAL THEME

Experience in perspection

OBJECTIVES

1. To reinforce perspective
2. The horizon is where the land or water and the sky meet.
3. Your viewpoint changes as your height above the ground changes.

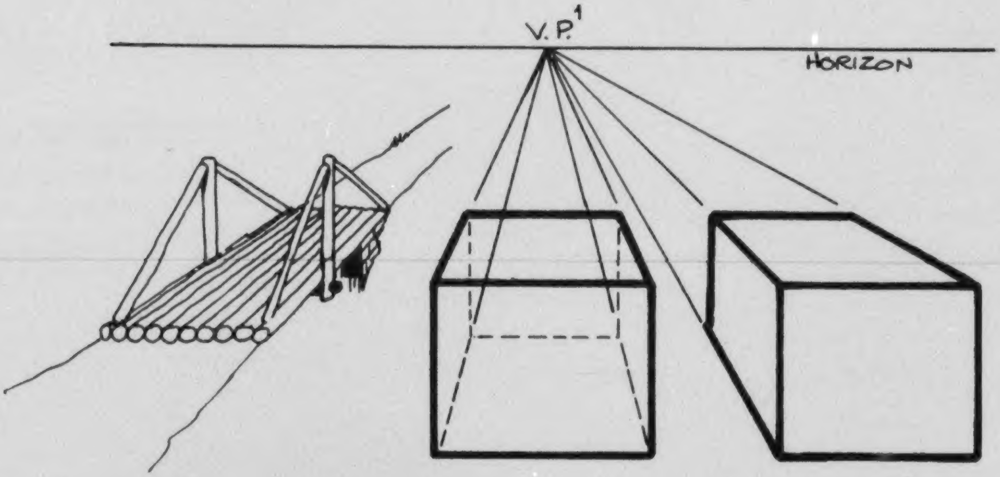
Equipment and Materials

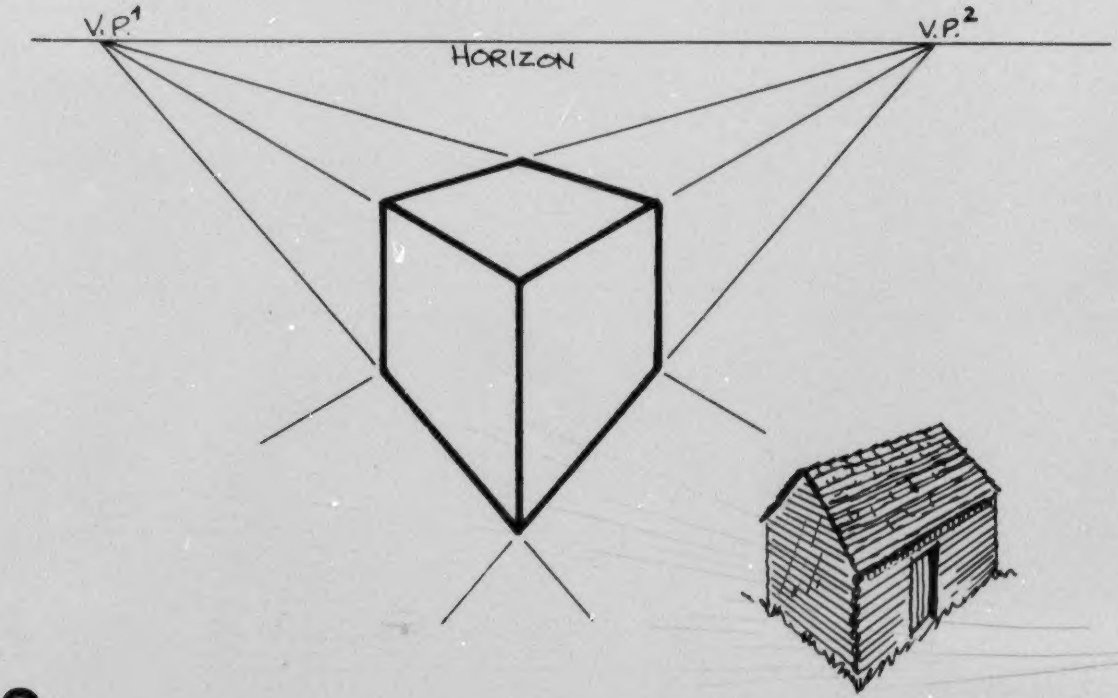
Pencil	Eraser
Paper	Ruler

PRE-ACTIVITIES

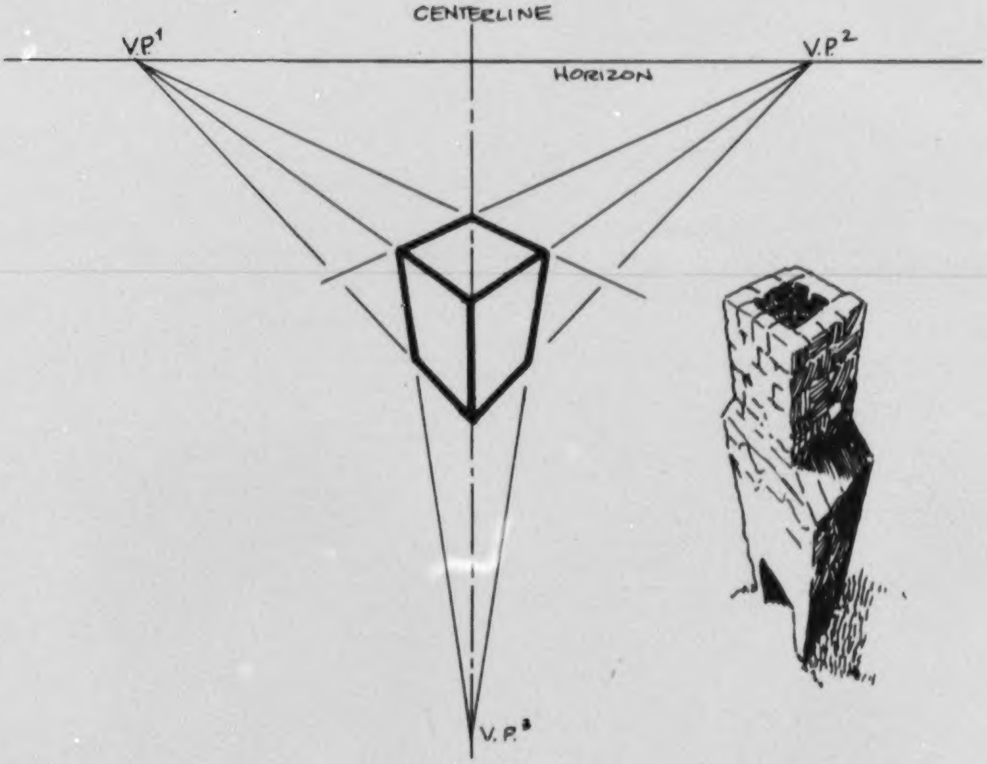
1. Show slides from Jacobsburg State Park.
2. Practice and patience will be needed for this lesson by both student and teacher.
3. Explain and practice the following perspectives using books, straight roads or buildings as objects:
    - A. One-point perspective - Looking at one object directly in front of it. As you go farther and farther away, the lines appear to converge and eventually meet at the horizon.
    - B. Two-point perspective - View the object from a corner. You now see two sets of parallel lines, each leading away into the distance. Each time an angle of the object is changed, the vanishing point changes. Each of these sets of parallel lines will have its own vanishing points.
    - C. Three-point perspective - View the object from a sharp angle. There is a third set of converging lines and three vanishing points.
    - D. In three-point perspective, the vanishing point would be below the horizon, unless you are looking up at an object such as a fireplace chimney.

1


V.P.1
HORIZON


V.P.1
V.P.2
HORIZON

2



ACTIVITY PROCEDURES

1. At Jacobsburg, you will find two fireplaces with chimneys. This will make a good object to use in drawing perspectives. Start with one-point perspective directly in front of the fireplace.
2. Two-point perspectives - use one of the corners.
3. Three-point perspectives - use an angle.
4. If you break down the groups into smaller ones, I'm sure you will find enough space for the experimental drawing.
5. There are very immense trees that can be used as drawing objects.

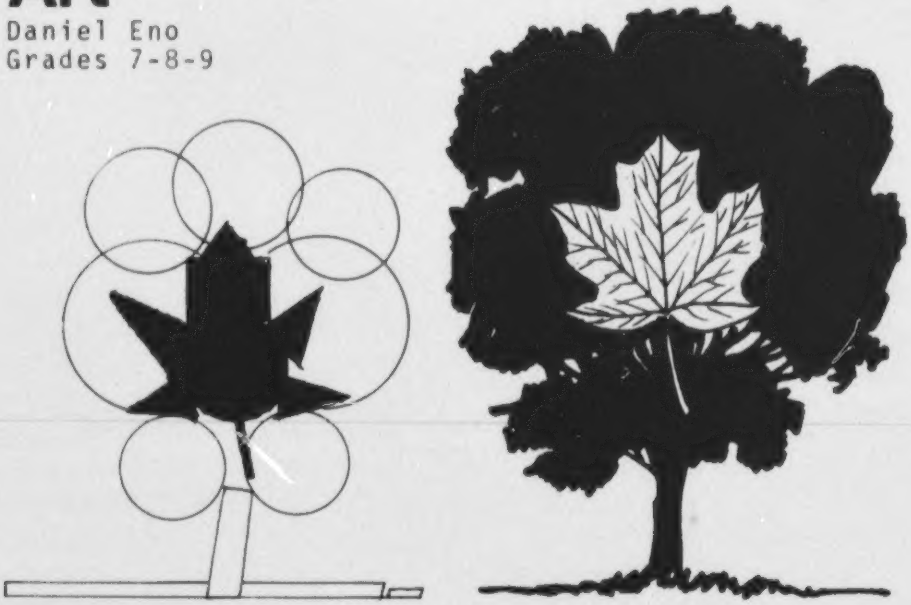
OTHER CURRICULUM AREAS

Math

The study of degrees, angles and distances.

Art

Daniel Eno
Grades 7-8-9



Sketching and Outdoor Appreciation

CONCEPTUAL THEME

A variety of designs and patterns exist in a natural form.

OBJECTIVES

1. To develop an awareness and appreciation of the patterns and designs found in nature.
2. To be able to see a complete picture or ecosystem and then be able to break it down to individual units which comprise the total picture. Also, to be able to break it down further to see and identify parts which comprise the units.
3. To understand that most man-made patterns and designs originate in a natural form.

Equipment and Materials (For Introduction)

1. Collect pictures of natural settings. Encourage close-up views of one particular unit, such as a leaf, flower or blade of grass.
2. Slides (especially to show detail) could be used, if available.
3. Construct some type of picture frame to use to isolate specific parts of the picture.

Introduction

1. View entire picture.
2. Using the frame, place it over the picture so it is narrowed down to a specific area.
3. Observe with students the various lines, patterns, and designs that are inside the frame.
4. Emphasize these parts of the whole as opposed to the whole unit or picture.

Equipment and Materials (For Field Trip)

Each student should be equipped with a soft pencil (with eraser), several sheets of paper, and some object (cardboard) to use as a writing board.

ACTIVITY PROCEDURE

Have each student "discover" an area that appeals to him. He should be encouraged to see the "whole picture" and then should start to narrow it down to several objects of interest. Thumb-nail sketches should be made of the various "parts" of these objects using:

1. Quick lines
2. Free moving
3. Shading
4. Details only

POST ACTIVITIES

From the thumb-nail sketches, finish in these ways:

1. Colored pencil finished sketch
2. Scratch board
3. Water color
4. Copper relief
5. Wax paper - water color resist
6. Find lines and patterns (man-made) in or around the school. How do these compare to original sketches?

The setting should be student-picked (within a limited area).

Daniel Eno
Grades 3 through 8

Movement and Energy

CONCEPTUAL THEME

Movement patterns of natural objects and their source of energy.

OBJECTIVES

1. To isolate shapes, forms, and objects, and to identify their various patterns of movement.
2. To understand the method (source of energy and cause) of movement of living and non-living things.
3. To understand the movement capabilities and limitations of the human body.
4. To understand that nothing is physically constant forever.

Equipment and Materials (For Introduction)

Films or slides showing much man-made, natural (plant and animal) movement could be used.

Pictures of natural settings and wildlife.

Introduction

1. View in its entirety one of the above listed forms of media.
2. Have each student list all of the various patterns of movement that he sees.
3. Have several volunteers each demonstrate one type of movement which they observed.
4. Have remaining students guess what movement pattern is being demonstrated in each case.
5. Have several students pair up and repeat steps #3 and #4.
6. Identify several stationary objects that were seen in the audio-visual material.

   A. Do these objects have any movement pattern? Why or why not?

B. Will they ever move?

C. Have they been there forever?

D. What conditions will finally cause them to move? (wind, water force, erosion, sunlight and man-made activities are some factors involved.)

Equipment and Materials (For Field Trip)

Old or play clothes

ACTIVITY PROCEDURES

1. In a natural setting, have each student select a living or non-living object which is moving.
2. Have each student "become his object", and in so doing, duplicate its movement.
3. Does your object have only one type of movement pattern? Under what conditions would it move differently? Duplicate as many movement patterns as you think of for your object.
4. Have the student share his object and its movement with the rest of the class (individual demonstrations).
5. Select an object of interest which is not moving.
6. Assume its physical position. Duplicate it as closely as possible with your body.
7. Does your non-moving object ever move? Will it ever move? What may cause it to move? What is the speed of this movement? Assuming its position, move as you feel it may move. Can you move slowly enough?
8. Have various students share their "non-moving" experiences with the rest of the class.
9. Find an object of interest that has not or will never move. Is there any such thing?
10. Do things that move slower "live" longer? How does man fit into this pattern?
11. Discuss all possible causes of movement.
12. Discuss the sources of power necessary for different kinds of movement.

POST ACTIVITIES

1. In gym or playground area, have relay races using different forms of animal movement. A few examples may include:

   A. Fox

   B. Bird

   C. Kangaroo

   D. Snake

2. Have several volunteers take turns in leading the class in different forms of creative movement patterns that they experienced on the field trip. Examples may include:

   A. Leaf movement of tree branch

      (1) On a still day
      (2) In a gentle wind
      (3) In a hurricane
      (4) When a bird lands on it

   B. Flower movement - very slow movement
   Starting with fetal position (completely flexed) climaxing with complete body extension, and returning to fetal position. This could simulate a flower's closed position in the morning, slowly opening its petals to complete extension to absorb as much sunlight as possible, and returning to a closed position as the sun sets. Encourage students (who are the flowers at this point) to "feel" the time lapse involved. Compare the time it takes them (2-3 minutes) to the time it takes the flowers. Could they do it as slowly as the flowers?

   C. Use group movement activities to recreate some of the things observed on the trip. A few examples may include:

      (1) Make a flower. If students need more direction, have approximately 13 students lie on the floor - some form petals, some form leaves or stem. Using a camera, get an aerial shot of the "flower". Develop and observe. Next time try to make a more perfect flower. Encourage flower movement (as a group). Each student should feel himself as a part of the whole.

      (2) Have students (in pyramid formation) recreate some structures such as a tree, rock ledge, bird's nest, flower or an animal. Try as a group to assume any movement pattern which is applicable to your structure.

NOTES

1. This learning experience can be used for a wide range of grades by intensifying or simplifying the complexity of the presentation.

2. Many of the activities listed under "Post Activities" could be better experienced in a natural setting if conditions permit.

3. It probably would be good to sexually segregate students in grade 6 and above before engaging in some of the "close" group activities.

4. There are many important environmental concepts which should be incorporated into this lesson in a timely manner by the teacher. Some of these include:

   A. Energy sources necessary for movement. What objects move under their own power at will? Where do they get their source of energy? For herbiferous animals, explore the importance of green plant life. Does man get any energy from air? Where does this (O_2) come from? Explore the process of photosynthesis and discuss its significance to man and animals. Where do plants get their energy from? Correlate all movement to the natural elements - sunlight, air, water and soil.

   B. What forms of energy become recycled? What are some examples of energy used which is not recycled? What are some examples of stored energy? Is our supply of energy unlimited? What is the significance of wasted energy? How can more energy be recycled?

   C. Contrast and compare "long-term" movement (as the meandering of a stream, erosion, or glacial movement) with visible movement. Which has the most profound effect?

   D. Each person is only a very small part of the total environmental picture. Why is each individual important in relationship to his environment? How can a person become more important in relation to his environment?

There is no one certain area where this lesson must be taught. Pick an area with as much visible movement as possible. However, any area will suffice.

OTHER CURRICULUM AREAS

Physical Education	Language Art
Movement Education	Science
Art	

Art

Stan Komosinsky
Grades 7-8-9-10

The Maze

CONCEPTUAL THEME

When one sense is blocked or removed, other senses seem to be heightened. People develop many inter-relationships and interdependencies with their surroundings and other people.

OBJECTIVES

Cognitive - The student will find a way out of a maze while being blindfolded.

Affective - The student will try to express his feelings while trying to find an exit. This will be done after successful completion of activity.

Equipment and Materials

100 Yds. rope or heavy string
Opaque blindfolds

ACTIVITY PROCEDURES

A maze should be designed, using trees as posts, for a problem. A simple construction is best. After explaining to students that no talking should occur, divide students into groups, lead them into maze, allowing them to find an exit.

POST ACTIVITY

Have students express their feelings.

EXTENSIONS

This activity can be done for many reasons. After reading, it would be required of you to try to explain why heightening a sense and coming into contact with another person is helpful in solving a problem.

Pick a spot where string can be stretched three feet from the ground. Make a maze with the string by wrapping the string around trees. Make sure the ground is free from objects which might trip a blindfolded person. The maze does not have to be complicated, but it should have one entrance which would obviously be the only exit. You introduce each student to a blindfold, have them hold hands, be silent, and lead them into the maze.

The number to each group should not exceed four. It might be wise to let students choose what kind of plan would be best to complete the problem. Each group of four might split into pairs or go individually. Reasons for the student chosen grouping should be given after the activity is completed.

OTHER CURRICULUM AREAS

Science

Art

Stan Komosinsky
Grades 7-8-9-10

CONCEPTUAL THEME

The differences between natural and man-made surroundings bring about different attitudes and values within a person. Positive and negative "feelings" are related to a person's surroundings.

OBJECTIVES

Cognitive - The student should observe natural and man-made surroundings in order to develop a series of interrelated slides.

Affective - The student will inquire into what affects a person's "feelings" in regards to man-made vs. natural surroundings.

Equipment and Materials

- Camera
- Film
- Notebooks
- Pens
- Pencils

PRE-ACTIVITIES

Cut out a 3" x 5" cardboard frame. This frame can be used as a mock camera to have students become familiar with choosing their picture.

If students have had no experience using instamatic or 35 mm. cameras, it would be helpful to explain the operational aspects of their particular piece of equipment.

Before taking pictures, the sequence of pictures to be taken should be planned as to what influence they will make on a person.

ACTIVITY PROCEDURES

Have students take pictures.

POST ACTIVITY

Evaluation of pictures. This can be done by using other students as critics.

OTHER CURRICULUM AREAS

Science

Art

Stan Komosinsky
Grades 7-8-9-10

CONCEPTUAL THEME

A leaf is characterized by a definite shape. This shape is developed through a network of veins.

OBJECTIVES

Cognitive - The student should find five different shaped leaves and should sketch either the outside design or the network of veins which gives the leaf its shape.

Affective - The student should appreciate the leaf as an intricately constructed object, the veins being responsible for this construction's shape.

Equipment and Materials

Drawing paper Pencil

PRE-ACTIVITIES

Have students collect five different leaves.

ACTIVITY PROCEDURES

Have students draw leaves. If a student's ability to draw perplexes him, leaf rubbings, prints or pressings may be made. In a field or at a place where removal of leaves would be unwanted, a drawing could be made of the leaf as a live model.

POST ACTIVITY

A critique of drawings should be made and a display posted.

It would be helpful to inform the students of a leaf's job; that is, transforming light and nutrients into energy, growth and production of oxygen.

OTHER CURRICULUM AREAS

Science

Nature

Math

Art

Stan Komosinsky
Grades 7-8-9-10

CONCEPTUAL THEME

There are many factors which determine man's attitude toward his surroundings.

OBJECTIVES

Have students identify a site for construction of a shelter. Reasons for choosing this site should be given. The reasons should be explained using economic, political, social and aesthetic variables.

Equipment and Materials

These would be student chosen.

PRE-ACTIVITIES

Have students show pictures of places where they would like to live. Reasons should be given.

ACTIVITY PROCEDURE

Tell students they have a set amount of money with which to work. Students should pick an area in which they would like to live. They are to design a shelter suitable to their area.

POST ACTIVITIES

Evaluation of the designs should be made regarding feasibility of structure in regards to "living" in such a place. Construction of designed shelters, if possible.

OTHER CURRICULUM AREAS

Science

Mechanical Drawing

Art

Stan Komosinsky
Grades 7-8-9-10

CONCEPTUAL THEME

To identify earth, water, air and light as basic "elements".

OBJECTIVES

Cognitive - To construct an inter-relationship which shows soil, air, water, and light affecting an organism (plant or animal).

Affective - To appreciate the need for those "elements" to exist without alteration by an outside force, and to show the need to reduce or stop such alterations.

Equipment and Materials

Student chosen

PRE-ACTIVITIES

Have students identify places where they can see these four "elements" together.

ACTIVITY PROCEDURES

1. How can these four "elements" be shown influencing man?
2. How would these four "elements" influence a potted house plant?
3. How would a "storm" filled creek influence the banks which contain it? How would this affect man?
4. How can these "elements" be used constructively for shelter?

After students have discussed or shown examples detailing these or similar questions, have students make up (by drawing or constructing) a model of the four "elements" affecting a plant or animal.

POST ACTIVITIES

A peer evaluation of each student's model and critique.

OTHER CURRICULUM AREAS

Science - Physical laws

Nature - Plant and animal dependencies

Industrial Arts - Construction of models

Art

Stan Komosinsky
Grades 7-8-9-10

CONCEPTUAL THEME

Constructing a fresh water environment.

OBJECTIVES

Cognitive - To identify and model the components of an aquatic community.

Affective - To become aware of the need to keep models natural.

Equipment and Materials

- Container for water
- Filtering system
- Aquatic life
- Non-living materials
- Thermometer

PRE-ACTIVITIES

Have students visit a local pet store to observe and list the parts of an aquatic environment.

ACTIVITY PROCEDURES

Student response sheet - Can be a plain sheet of paper for listing or preferably drawing what the student sees as an aquatic community.

1. Where is this community located in regards to light?
2. What kind of bottom is present?
3. What kinds of plants and animals are noticeable?
4. How should the animals be fed?
5. What is the temperature of the water?

POST ACTIVITIES

After drawings of observations have been made, the students should go about modeling what has been seen. A water tight tank, gallon jar, anything transparent can be used to hold the water. Obtaining plant and animal life can either be done at local streams and ponds or at a pet store. It is necessary to let students know that a balance of plants and animals, food, light and temperature is necessary for the community to survive.

OTHER CURRICULUM AREAS

Science

This activity should be done in cooperation with a teacher who has a thorough knowledge of aquatic life and communities. Questions regarding numbers, temperature, tank sizes can be answered by such a person. If one is not available, there are many books on nature activities and hobbies which will have the necessary information. It is important to keep in mind that the students should use what they see as their information. Questions regarding "how many", although this may sound inhumane, should be done by survival. The importance of populations can easily be recognized in this manner.

Art

Stan Komosinsky
Grades 7-8-9-10

CONCEPTUAL THEME

Problem solving, inquiring into a problem and developing a plan of action. Interdependency exercise.

OBJECTIVES

Cognitive - To make a stand which will hold four people for one minute.

Affective - To understand that people are dependent of others in stressful situations.

Equipment and Materials

3-12' long, 6" diameter branches
50 Ft. 1/2" diameter rope.

ACTIVITY PROCEDURES

Students will construct in 15 minutes a stand to support four people for one minute. Evaluation is successful if operation of construction is met.

OTHER CURRICULUM AREAS

Science

Physical Education

Dean Sadowski
Grades - 9-10-11-12

Environmental Art Appreciation Through the Lens of a Camera

CONCEPTUAL THEME

For centuries, man has looked at his environment in appreciation of its beauty. It goes without saying that "art" is everywhere. The abundance of art forms sometimes confuses the beginner; therefore, it is important for the teacher to keep the students in the proper perspective. Basic concepts such as color, shape, line, harmony, balance, etc., can be easily confused when looking at such a combination of "art". To avoid confusion, it is suggested that the students be well prepared in these concepts (in the classroom).

The format used is totally flexible. In this lesson, you are dealing with the "feeling" of the students; therefore, be "open" to their thoughts. Let several avenues of thought available for every activity. Let the students exchange ideas and opinions. Interaction will be the key to learning. In short, the students will experience the beauty of the environment and in doing so, appreciation of its beauty will come naturally.

Choice of teaching method is optional although in this particular situation, the less the teacher says, the better. By using the "discovery method", the students will answer their own questions through experience and interaction. When confronted with a direct question, give the student enough information so he or she can find the answer on their own.

In conclusion, although the students are participating in an "art" activity, hopefully, they will develop a deeper understanding and love for their beautiful surroundings.

OBJECTIVES

Upon completion of this activity, students will be able to:

1. Distinguish and identify various art concepts.
2. Focus and sight the camera properly.
3. Appreciate the environment as a work of "art".

Equipment and Materials

Handouts	Cameras
Binoculars	Film

PRE-ACTIVITIES

Draw up handout sheets listing the various concepts. (Have the students define and give examples, if necessary.) Depending upon the number of students, assign a student or group of students a "concept". Make sure each student has a good understanding of each concept, particularly his or her own. A slide show or handout pictures can be helpful at this point.

Have the students construct binoculars out of cardboard and tape (by limiting the field of vision, the eye becomes more sensitive to detail and form).

Select an area complete with wildlife and vegetation where the students can work (the larger, the better).

Conduct a class on the proper use and focusing of the camera. (Caution: Some students may not have a camera or any experience with a camera. Possible solution: See if the students can team up or share each other's cameras. A class of 25 students could probably get by with five cameras. Today's cameras are easy to use.)

ACTIVITY PROCEDURES I

Goal - To photograph properly "art concepts" in a natural environment. Once the students know exactly what they are looking for, ask them to search the park area for samples of their particular "art forms". To avoid confusion, ask the students to spread out as much as possible. If each student does not have his or her own camera, tell them to mark the area with some flags (anything will do) to identify their pictures until they can borrow a camera. Once all of the students have taken their pictures, this activity is complete.

POST ACTIVITY - This activity can also be a form of evaluation.

When the pictures are developed, have the students examine their own, as well as each other's, for comparison. Suggest constructive criticisms where necessary. Gather all of the photographs and assemble a display board for the students to observe. Using the display board, point out the best examples of art concepts, as well as the poor ones. (Students learn by their mistakes.)

ACTIVITY PROCEDURES 2

Goal - To combine the individual "art concepts" photographed in Activity 1 into a single scene picture. Have the students search the assigned areas for examples of good scenery which exhibit as many "art concepts" as possible. Have them take a photograph. Once the students have taken their pictures, this activity is complete.

POST ACTIVITY

Have the students compare and contrast the photographs. Have each student present his or her photograph to the class for discussion. Have the class determine if the photograph exhibits good art concepts. Once the students have evaluated the photographs, have them make a collage of all scenes. After the work is done, the collage can be hung up as a display (and a reward) for a job well done.

EXTENSIONS

Have the students display their collages as an art exhibit for the school community.

OTHER CURRICULUM AREAS

Math

Have the students study the relationships between stops and shutter speeds and lenses (with science).

Science

Technical background in lenses, film and general mechanics of the camera (with math).

Language Art

Descriptive paragraphs or essays could be developed from photographs.

History

The invention of the camera and its influence on society.

Nature

Use the photographs to study species along with the relationships between living organisms.

STUDENT ACTIVITY SHEETS

Index

THE STUDENT ACTIVITY SHEETS THAT ARE CONTAINED IN THIS SECTION OF THE BOOK ARE TO BE USED BY TEACHERS AS A SUPPLEMENT AND TO GUIDE STUDENTS WHILE WORKING IN THE FIELD.

SOME MODULES IN THE FRONT SECTION OF THE BOOK DO NOT HAVE STUDENT SHEETS AND IF TEACHERS FEEL ONE IS NEEDED FOR THE MODULES THAT DO NOT HAVE THEM, IT IS SUGGESTED THAT THEY BE MADE DIRECTLY FROM THE MODULES AS THEY ARE PRESENTED IN THE FRONT SECTION OF THE WORKBOOK.

HISTORY

Page — Title

301 Colonial Living in Jacobsburg
303 Early Manufacturing in the Lehigh Valley
305 Locating Historical Sites
307 Unearthing an Indian Village

NATURE

310-324 Nature Awareness
311 Effects of Light
312 Water Life
313 Home in the Woods
314-322 Shapes and Patterns
315-323 Mobility
316 Comparing Habitats
317 Biotic and Abiotic Change
321 Physical Change
325 Physical Change and Erosion
327 Overlooking the Flood Plain
329 Man Changes the Environment
330 Awareness and Appreciation
332 Succession

MATH

335 Computing
337 Contour Mapping
338 Compass Course

SCIENCE

339 Pond Food Chain
342 Comparing Plots in a Forest
342 Streams Survey
342 Succession on a Bare Rock
342 Streams Profile
342 Constructing a Cruising Stick
342 Study of a Decaying Log or Stump
342 Food Web in a Stream or Pond
342 Line Transect Study
343 Plant Competition (for communities in nature)
345 Soils

LANGUAGE ART

Page	Title
349	Locating a Bee Tree
350	Creative Writing in the Oat of Doors (Expression & Discovery)
352	Senses
353	Woodland Word Hunt

ART

354	Nature's Patterns
355	Experimenting in Natural Colors
357	Color and Environment
358	Animal Tracks
359	Experience in Perspective
360	Experience in Color
361	Photography (art appreciation through a camera lens)
362	Taking Photographs of Art Concepts
363	The Maze
364	Feelings from Natural and Man-Made Environments
365	Leaf Drawing
366	Construction and Design of a Shelter
367	Modeling of an Organism Influenced By Soil, Air, Water and Light
368	Constructing a Fresh Water Environment
369	Evaluating Four People From the Ground for 1 Minute
370	Learning About Texture in Trees
371	Using Your Senses in the Forest
372	Line and Shape in Trees

William Metzgar - History
Grade 9

COLONIAL LIVING IN JACOBSBURG

How did the people of early Jacobsburg live in this area?

Use History sites

What to look for:

Site	Construction of house Spring flowing into house Side buildings
Site	Construction of house (numbered roof beams, handmade nails, pegs, lath and plaster) Springhouse
Site	Foundation and well

What to do:

Examine each site carefully and completely. Use your senses as completely as you can. Take your time; nobody is rushing you through on a guided tour. Use your imagination; let it help your senses. Locate each site on the map. Read the site data and material available in your packet.

Answer discussion questions from information obtained at the sites, and with data sheets and maps.

Try to confirm discussion questions answers using historical literature as listed in your teacher's bibliography and elsewhere. Your school and public library should have some materials.

Discussion questions

1. How were local materials used in the construction of homes and other buildings?
2. Certain materials are necessary for living. Make a list of these. From observing sites and their surroundings, how were these materials obtained?
3. As time passed, describe some changes you have found in the construction of buildings.

4. What problems of survival did the inhabitants of Jacobsburg encounter?
5. Why do you suppose the population of Jacobsburg declined?
6. How is nature reclaiming the area?

Gerald Newhart - History
Grade 8

Name of Activity - Early manufacturing in the Lehigh Valley

Site Location - Jacobsburg State Park, History Sites

Statement of Problem - Through the observations and activities you will be doing during this activity, you should be able to determine:

1. Why the early manufacturing moved into this area.
2. Where the raw materials came from to entice the manufacturing into the area.
3. Why the manufacturing had to change over the years.
4. Why the manufacturing finally came to a halt in the early 1900's.

Equipment

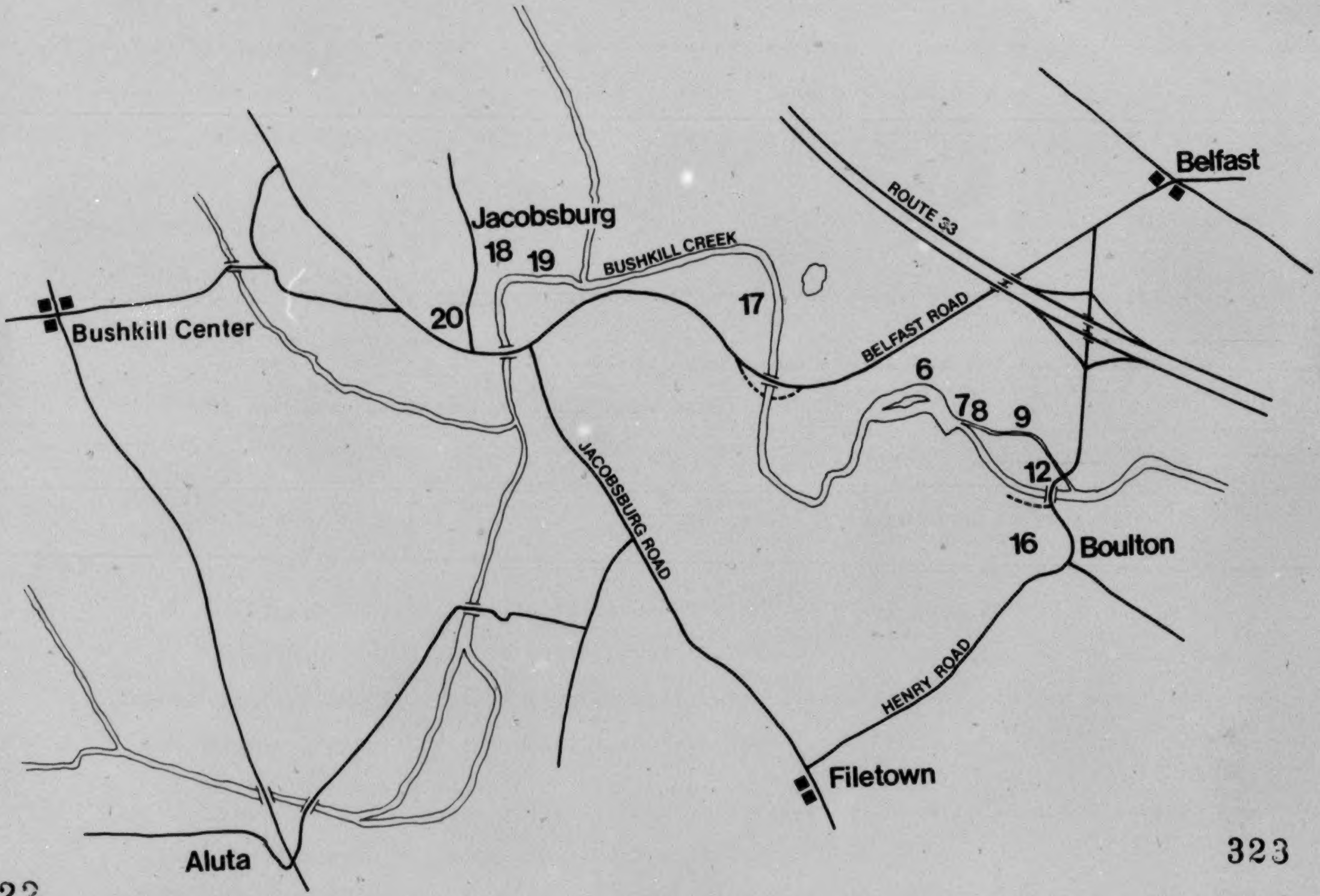
Slide pictures of Sites
Jacobsburg Chronology
Historic Sites of Jacobsburg State Park
Map of Historic Sites

Procedure

1. Go over the site data and maps included here.
2. Go to outdoor sites, check over each and try to determine the answers to problems stated above.
3. Answer the discussion questions from information obtained at the site and the data sheets with maps.

Discussion Questions

1. Why did manufacturing move into this area?
2. Name three raw materials which were available to help manufacturing at this time?
3. What changes in the types of manufacturing occurred over the years? Why?
4. Why did the manufacturing fall off and finally stop in the early 1900's?


Belfast
ROUTE 33
Jacobsburg
18
19
BUSHKILL CREEK
Bushkill Center
20
17
BELFAST ROAD
6
7
8
9
12
JACOBSBURG ROAD
16
Boulton
HENRY ROAD
Filetown
Aluta

Dennis Hahn History
John Podwika

Name of Activity - Plotting of Historical Sites

Site Location - Jacobsburg State Park, sites

Statement of Problem - Locate and plot the six historical sites studied previously.

Equipment- Unplotted map with symbol key, pencil, compass

Procedure

1. Meet at parking lot at Jacobsburg State Park to receive unplotted map.
2. Break up into groups.
3. Move into park area.
4. Using symbols on map, find historical sites and plot them on your map.
5. Return to parking lot.
6. Proceed to site as a total group (due to safety factors).
7. Discover and plot site
8. Report to parking lot for return to school.

Observations (data collection, charts, reports, etc.)

1. Discovering historical sites.
2. Importance of stream and landmarks.
3. Plant life found in area.
4. Rock and mineral deposits found in area.
5. Ability to use symbols in locating things.

Questions (Conclusions - lead questions for students to answer)

1. Why is the stream important?
2. What symbols did you use to locate the sites and return to the parking lot?
3. Did paths help in discovering of sites?
4. How did the compass help in finding sites?

Optionals

Extension - What can be done to further the experience beyond the activity?

Stephen Miller - History
Grade 7

UNEARTHING AN INDIAN VILLAGE

You are beginning an investigation of some of the more important kinds of evidence for human prehistory. Most of this evidence has been obtained by anthropologists through the use of a technique called archeology. The best way to come to understand just what it is an archeologist does and how he goes about doing it - that is, how archeology works - is to try doing it yourself. That is what you are going to do.

It is not our main purpose to make you into a professional archeologist. That takes many years of specialized study and field work. What we do hope will happen is that you will begin to understand some of the kinds of problems an archeologist has to face. With a little practice in putting together scattered bits of evidence, you may be able to explain some parts of human prehistory as well as the experts can, and some things may come to mean much more to you if you have figured them out for yourself.

You will examine the site just as an archeologist might have found it; the artifacts, the refuse, and the environment. You will have everything (except a lot of experience) that an archeologist would ordinarily have to work with. From this evidence, you will attempt to reconstruct the way of life of the people who occupied the site.

As an anthropologist-detective, there are several important points for you to keep in mind. The site was left by people who were alive when they lived there - it is only of interest insofar as it can tell us what these people were like and how they lived. Their ways of doing and thinking about things may have been quite different from your own so be ready!

Your teacher will give you a brief introduction. Then you should begin to search slowly and carefully for any remains of the village that once stood before your eyes. Dig carefully. The artifacts you may find represent very old tools and may be broken easily. When you unearth an artifact, call your teacher. She might have something to say about it.

Examine your "finds" closely and try to figure out whether its shape can tell you what it was used for. Imagine what life would have been like living in a village where you are now working. What would concern you most?

Along with every other human ecologist, the archeologist and anthropologist believes that the way people live is often very much influenced by the environment in which they live. This is particularly true of peoples who make their living by hunting and collecting. The land can supply food for only so many people; otherwise, the food gets used up. The climate, too, is an influential part of the environment, since food plants depend upon moisture and temperatures for the best growth. Also, food animals depend on plants. In cool climates, houses must be constructed for shelter; hence, people there may tend to be less willing to pick up and move frequently. If people are to stay in one place for a long time, can you see why there must be fewer of them? Other aspects of the environment - soil conditions, lay of the land (terrain), available water - are also important.

You remember that as an archeologist you were able to say some things with relative certainty about the people you were studying. They used fire, had metal, used stone and so on. Other things you could not figure out were: how many people occupied the site and for how long a time. Still other things were totally impossible to discover from the archeological evidence alone such as: What kind of religion did they have? Did they beat their children? How did they cure a cold? Were there marriage ceremonies?

As an archeologist, you must consider all the possibilities before trying to reconstruct those aspects of the way of life of an unknown people for which you have no real archeological proof.

Unearthing an Indian Village

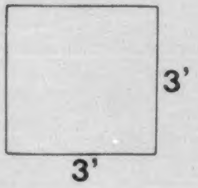
KEY

● Post molds

☐ Tamped Area

1. Venus
2. hand axe
3. projectile point
4. pebble stone
5. scraper
6. turtle shell
7. deer bones
8. human skull
9. jewelry
10. bowls
11. tablet

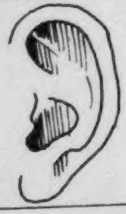
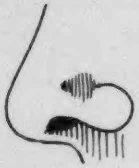
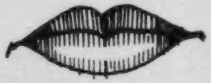
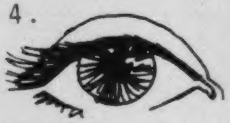
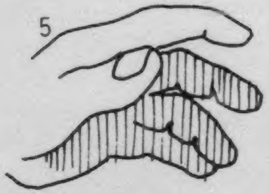
SCALE



									G
									F
									E
									D
									C
									B
									A
1	2	3	4	5	6	7	8	9	

Gregory Naudascher - Nature
Grade 5

DIRECTIONS - Find one thing that is best described by each one of the senses.

	Draw a picture of the thing that you picked	Write a sentence telling why you decided on this thing.
1. 		
2 		
3. 		
4. 		
5 		

Donald Sysko - Nature
Grade 6

Name of Activity - Effects of Light

Site Location - Any site in the woods or around the school.

Statement of Problem - What plants need sunlight and what plants live off other plants?

Equipment - Pencil

Procedure

Use as many of the sites as time permits. Walk around the site paying special attention to the ground cover. Fill in the chart. Go to other sites and follow the same procedure.

Observations

	Site	Site	Site
Plants in sunlight			
Plants in shade			
Parasites			

Questions

1. What plant received the most sunlight?
2. What would happen if it were placed in the shade?
3. Was any moss found? Where?
4. Which plants require the most water?
5. Were any parasites found?
6. What were they feeding on?

Name of Activity - Water Life

Site Location - The pond

Statement of Problem - What life exists in a pond?

Equipment - Pencil

Procedure

Quietly approach the pond area. Quietly observe the happenings in and around the pond. Complete the following chart.

Observation

Plant or Animal (Name, draw or describe)	Home	Food

Questions

1. Did you see any movement as you approached the pond?
2. What kind of plants and animals live in and around the pond?
3. Did plants and animal life differ according to the depth of the water?
4. Do you think you saw all the inhabitants of the pond?
5. Was there evidence of plants and animals being dependent on one another?
6. Was there evidence of a food chain?
7. Did the animals have any effect on the water?

Name of Activity - Home in the Woods

Site Location - Any site in the woods and also around the school.

Statement of Problem - What animals are here now and what animals had been here?

Equipment

Circular #151 from Penn State University
Pencil

Procedure

Find a spot at any of the sites and use your sense of seeing and hearing for 15 minutes. Complete any of the areas on the chart which you have seen or heard. Go to another site and complete the chart for this site. While changing site, look for traces of animals.

Observations

	Site 1	Site 2	Site 3
Animals seen			
Animals heard			
Animal traces			

Questions

1. Do animals live in only one area?
2. Do animals spend all their lives in one area?
3. How does nature help animals detect danger?
4. Do animals have different diets?
5. Do some animals search for food more than others?
6. What effect does climate have on the animal and its food supply?

Name of Activity - Shapes and Patterns

Site Location - Any site in the woods or around the school.

Statement of Problem - What plants should be avoided both in the woods and around the home?

Equipment

Poisonous plant charts
Pencil

Procedure - Do not touch any of the plants. While walking through the woods, watch for plants which you feel are poisonous. Complete the following chart.

Observations

Leaf shape (Draw or explain)	Type of growth (shrub, tree, plant)	Symptom of poisoning

Questions

1. How can you always identify poison oak or ivy?
2. Which grows as shrubs? Which as flowers?
3. What parts of the plant might be poisonous?
4. What are symptoms of plant poisoning or allergies?

Name of Activity - Mobility

Site Location - Any site in the woods or a site around the school.

Statement of Problem - What birds inhabit our environment?

Equipment - Pencil

Procedure

Go to any of the sites in the woods or a site on the school grounds. Quietly site for ten or fifteen minutes. Fill in the chart from your observations. Move to another site and follow the same procedure.

Observations

	Site	Site	Site
Bird			
Diet			
Home			

Questions

1. What birds could you identify by sight?
2. What birds could you identify by sound?
3. Could you observe any of their eating habits?
4. Did you find the same birds when you changed sites?
5. Did you see any of their homes?
6. Are the birds found in the woods the same type of birds found around the school?

Robert Burak - Nature
Grade 7

Name of Activity - Comparing Habitats

Site Location - Pool Site, Field Orchard Site, Creek-Forest Site

Statement of Problem - Information will be gathered at each site for further comparison.

Equipment

- Lap Board
- Pen or Pencil
- Plant and Animal Identification Key
- Pool Site Data Sheet
- Field Orchard Site Data Sheet
- Creek-Forest Site Data Sheet
- Rotting Log Data Sheet

Procedure

Upon your teacher's direction, carefully explore each of the habitat sites and complete each data sheet. Be sure to complete all observations and answer all questions.

Questions

1. Were there any physical features that were the same in all three habitats?
2. Were there any animals that were the same in all three habitats?
3. Were there any plants that were the same in all three habitats?
4. Were there any odors that were the same in all three habitats?
5. Were there any sounds that were the same in all three habitats?
6. Were there any textures that were the same in all three habitats?

ROTTING LOG DATA SHEET

List the biotic and abiotic factors presently at work on the stump or log.

Biotic Factors	Effect on Stump or Log
Abiotic Factors	Effect on Stump or Log

1. What things about this stump give us clues of past events that have taken place?

2. What factors may have caused these things to happen?

3. List any producers present.

4. List any consumers present.

5. List any decomposers present.

6. Identify and describe a food chain involving the stump.

7. Identify and describe an energy chain involving the stump.

8. What would happen if one of the links in the food or energy chain was broken?

CREEK-FOREST DATA SHEET

Odors Identified

Sounds Identified

Textures Identified

Animals Identified

Animal Life Requirements Identified

Plants Identified

Plant Life Requirements Identified

Physical Features Identified

Nature

FIELD-ORCHARD DATA SHEET

Odors Identified

Sounds Identified

Textures Identified

Animals Identified

Animal Life Requirements Identified

Plants Identified

Plant Life Requirements Identified

Physical Features Identified

POOL SITE DATA SHEET

Odors Identified

Sounds Identified

Textures Identified

Animals Identified

Animal Life Requirements Identified

Plants Identified

Plant Life Requirements Identified

Physical Features Identified

1. How can the physical features of this area affect the type of plant and animal life present?

2. How are the plants and animals of this site suited for their habitat?

3. What evidence of adaptation do you see?

4. What evidence of succession do you see?

5. What evidence of changes occurring or having occurred in this area do you see?

6. Which of these changes is man responsible for?

7. How could man help this habitat by change?

8. How could man harm this habitat by change?

9. Identify and describe a food chain of this habitat.

10. Identify and describe an energy chain of this habitat.

SHAPES AND PATTERNS

Drawing of Leaf	Distinguishing Traits

MOBILITY OF PLANTS AND ANIMALS

Seed Drawing	Possible Dispersal Methods	Elaborate Dispersal

AWARENESS

Touch	Sight	Hearing	Smell	Taste

5 Seconds at 5 Feet	5 Minutes at 5 Feet	5 Minutes - Close-up

Name of Activity - Erosion at the Mill Run

Site Location - Where the Mill Run enters the Bushkill.

Statement of Problem - Why is there a difference in the steepness and depth of the creek bed and banks along the creek?

Equipment

Tape rule, Meter Stick or Yard Stick, Stop Watch

Procedure

Start your experiment at a point close to where the Mill Run meets the Bushkill (point A). From this point, pace off about 60 steps along the creek into the forest away from the Bushkill (point B). At point A, measure the hieght and width of the stream banks at four places, 2 feet apart. Find the average and record this data. Measure the width and depth of the stream; record this data. Pace off 15 feet of the creek bank. Post two students at each end of the 15 feet. Release a twig that floats and measure in seconds the time it takes to travel this distance. Repeat three times and record this data. Repeat the above at point B and record the data.

DATA COLLECTION AT POINT A

Trial I
1. Depth Banks:
2. Width Banks:
3. Depth Stream:
4. Width Stream:

Trial II
1. Depth Banks:
2. Width Banks:
3. Depth Stream:
4. Width Stream:

Trial III
1. Depth Banks
2. Width Banks
3. Depth Stream
4. Width Stream

Trial IV
1. Depth Banks
2. Width Banks
3. Depth Stream
4. Width Stream

Addition of all ones divided by four = Average Depth of Banks

Addition of all twos divided by four = Average Width of Banks

Addition of all threes divided by four = Average Depth of Stream

Addition of all fours divided by four = Average Width of Stream

Stream Speed Trial #1 __________
Stream Speed Trial #2 __________
Stream Speed Trial #3 __________

Total Divide by 3 = Average

Conclusions

1. At what point (A or B) do you get the highest average readings? Why? Is there a direct relationship existing here?

2. In general, does the slope of entire creek bed contribute to the steepness and depth of the banks? How? Suppose the slope were greater, would the banks be steeper?

3. What relationship exists between the speed of the water and the depth of the banks?

Name of Activity - Overlooking the Flood Plain

Site Location - On the south side of the Bushkill Creek, along the hillside above the Creek. To get to this spot, you must walk the length of the path along the Creek until you come out on the macadam road, cross over the metal bridge, make a right turn. Go up the overgrown road past an old barn through an open field and continue on this path until you come to a forest bank that is tilted about 30 degrees. You will be able to see the Creek below with the edge of an island.

Statement of Problem - Why do we have an undergrowth of plants that seems to be patchy? What causes this?

Equipment

Tape Rule
Paper
Pencil
Stakes
Hammer

Procedure

At any convenient spot, stake off a 100 sq. ft. area on the hillside. In this area, you must draw a map of the location of all trees forming the cover overhead and the location of bushes and any other green plants on the floor and in the staked off area. You should also draw any open areas in the trees overhead that allow sunlight to fall into your square.

Make another map of this area. On this map, place all slanted or crooked growing trees, and plants with a note as to the direction of slant. On this map, place the locations of any slimy plants non-green, mushrooms and toadstools.

Observations

From your maps, see if you can discover any patterns that exist. Is there a pattern that exists as to amount of light falling more in some places? Patterns of green plants on the floor? How does the daily motion of the sun cause light to fall on the floor?

Questions

1. What kinds of plants exist at both sites? What are the differences in size?

2. Compare the amount of leaves and humus at both areas. Which has more?

3. What location offers more hiding places for animals?

4. Which area will allow water to run off more quickly? Why?

5. Which area probably has less life forms? Why?

6. Write a short report on what you have learned about the differences between these sites.

Name of Activity - Man Changes the Environment

Site Location - This is a cleared area. After following the road from the parking lot for about 300 ft. into the woods, you will recognize this as a main picnic area and once a Girl Scout Camping area. A chimney or fireplace still exists here.

Statement of Problem - How to determine what effects man has on a forested region.

Equipment

Paper, Pencil, Tape Rule

Procedure

Use the chimney as a starting point. In a direction opposite the creek, you will find that if you walk about 50 or 60 feet, the floor of the forest will change from tightly packed clay with almost no shrubs to a spongy shrubbed area. These two areas are to be investigated. Stake off 50 ft. of each area. As you investigate, answer the following questions of each area.

	Tightly packed area including chimney	Shrubby, spongy area
Inorganic (exclude rock)		
Organic		
Man-made		

Name of Activity - Awareness and Appreciation

Site Location - Any of the six nature sites

Statement of Problem - To study seasonal changes in living things in a certain area of Jacobsburg State Park.

Equipment

Clothesline wire hoops, measuring 88 3/4", divided by twine into 4 quadrats
Paper
Pencils

Procedure

1. Class is divided into groups of five.
2. Each group tosses hoops on designated area of park.
3. One student works in each quadrat, the fifth student records. Plants and animals are listed and counted. Procedure should be conducted in fall and repeated in spring.

Observations - The recorder should use attached quadrat data sheet to record all data collected by the other members of the group.

Questions

1. What obvious changes have taken place in the area?
2. Why have some plants diminished in number while others have increased?
3. What happened to all the seeds and fallen leaves?
4. What new plants and insects have come into the area?
5. Is there evidence of litter?
6. Is there evidence of man's activities in this area?

Conclusions

How do seasonal changes affect a specified area of Jacobsburg State Park?

Quadrat Data Sheet

Date ____________ Investigator ____________________

Time ____________ Station ______________________

Weather Conditions:

Air temperature __________________ Dry bulb temperature _______________

Barometric pressure _______________ Wet bulb temperature _______________

Dry condition _____________________ Relative humidity __________________

Soil Conditions:

Soil temperatures: surface___________4"___________8"________________

Soil type __________________ Quadrat size ____________________

ph __________________________ Moisture content _________________

Vegetation:

Type _____________________ Dominant species _________________

Organisms:

Plants common name	population	Animals common name	population
1.__________	__________	1.__________	__________
2.__________	__________	2.__________	__________
3.__________	__________	3.__________	__________
4.__________	__________	4.__________	__________

Name of Activity - Succession in a Field

Site Location - Nature sites

Statement of Problem - To recognize stages of succession in plants and animals from cultivated land to pioneer weed stage.

Equipment

Paper	Soil kits
Pencils	Thermometers

Procedure

1. Class is divided into groups of four students.
2. Each group is stationed at different area of site and
3. Students in each group will conduct survey of area in accordance with data sheet.

Observations

The recorder should use attached succession data sheet to record all data.

Questions

Questions on data sheet should be answered.

Conclusions

What is natural succession of a field and how can it be compared to a cultivated state?

DATA SHEET

Most Abundant Invertebrate Orders ON VEGETATION

	Order	Abundance
1.		
2.		
3.		
4.		
5.		

Most Abundant Invertebrate Orders IN THE SOIL

	Order	Abundance
1.		
2.		
3.		
4.		
5.		

Vertebrates Observed

	Species	Quantity
1.		
2.		
3.		
4.		
5.		

Vertebrate Signs

	Species	Signs
1.		
2.		
3.		
4.		
5.		

What effects do animals such as rabbits, deer, mice, domestic livestock, birds, insects have on the progress of succession at this stage?

Student ______________________________ Date ____________________

Location ________________ Weather ____________________

Soil Type __________ Depth of A Horizon _____________ Soil pH ______________________

Soil temperature __________ Air temperature _____________ Drainage __________________

Amount and type of organic matter on ground ____

What physical factors seem to be important in controlling plant distribution in this community?

Most important plant species, by density.

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.
17.
18.
19.
20.

Are any woody species present? Are they seedlings or sprouts?

If they are sprouts, have they been recently clipped by herbivores?

Do any plant species tend to be clumped in relatively pure stands? Significance?

Are the herbaceous species mostly perennials or annuals?

What special adaptations are found among these species which qualifies them to be pioneers? (Methods of propagation, type of roots, features which resist desiccation, or flooding, etc.)

Name of Activity - $\frac{1}{25,000}$ of a hectare

Site Location - Orchard and forest floor, Jacobsburg State Park

Statement of Problem

To use a $\frac{1}{25,000}$ of a hectare hoop to study universal sets of plants, animals, insects and non-living things.

Equipment

$\frac{1}{25,000}$ of a hectare hoop for each group of five.

Procedure

1. Toss hoops on ground.
2. With one student in each quadrant and one recorder, count the number of plants, animals, insects and non-living things in each quadrant.
3. Be sure to count everything carefully. Record all that you find.
4. Conduct the hoop count in different vegetation areas - the orchard, forest.

Observations

The recorder keeps a tally for each quadrant and then totals the number of plants, animals, insects and non-living things found in the hoop for each vegetative area.

Questions - To discuss between hoop groups

1. What differences were there between the vegetation areas?
2. What was in the one area that the other lacked? Why?
3. What are the consequences of man's activities in the areas?
4. What makes it possible for the animals, plants, insects to live here or not to live here?

Extension

Conduct the hoop count during the different seasons of the year. What obvious changes took place? Why was there a change in the number of elements in the universal sets from one season to another? What happened to the plants, animals and insects in the fall and winter?

Conduct the hoop count in the park in the orchard and in the forest. Now do the same in different areas around the school. Answer the same questions you did in the park.

Name of Activity - Contour Mapping

Site Location - Site

Statement of Problem - Measure the horizontal distance transversed with each one metre rise in elevation.

Equipment

Metre stick	Plastic clothesline
Metric tape	Aluminum stakes
Sighting level	

Procedure - Work in teams of three

Position person ______________________

Observer ______________________

Measurer-Recorder ______________________

1. Record relative position along contour here Team Number ____________
2. Observer sight with level on top of metre stick and direct position person to place a stake at a point one metre than original position. Intervals between groups (5 metres) must be maintained, while proceeding straight up the hill.
3. Measurer check transversed distance and record below.
4. Repeat above steps to the crest of the hill, aluminum stakes should be gathered as no longer needed.

Vertical Rise	Horizontal Transverse
1 metre	____________
1 metre	____________
1 metre	____________
1 metre	____________
1 metre	____________

Name of Activity - Mathematical Compass Course

Site Location - Compass course starts at the stone chimney in Henry's Woods near site
The entire course is laid out in this vicinity.

Statement of Problem

You and your partner are to use your compass to find your way to each of the six stations (in order) that make up the course. When you get to a station, you will find a problem to solve. The answer to this problem will give you the compass reading to the next station.

Equipment (per team)

1 Compass	Paper
1 Diameter tape	Pencil

Procedure

At the stone chimney, you will find a container that holds a sheet of paper that has a math problem on it. The answer to the problem is the degree reading to follow to get to Station 2. Write your answer on the space provided below and then work with your partner to find Station 2. When you get to Station 2, repeat the procedure. Repeat it again at each station until you arrive back at the starting point. If you get lost, don't panic. You aren't far from where you started. Do your best to get back to the starting point.

The answer to the problem at Station 1 is ____________

The answer to the problem at Station 2 is ____________

The answer to the problem at Station 3 is ____________

The answer to the problem at Station 4 is ____________

The answer to the problem at Station 5 is ____________

The answer to the problem at Station 6 is ____________

Name of Activity - Pond Food Chain

Site Location - Site

Statement of Problem - Does the environment really have anything to do with a food chain or do they just happen?

Equipment - For every two students

- 1 Microscope
- 1 Enamel Pan
- 1 Small Hand Shovel
- 1 Measuring stick to determine depth of water
- 1 Thermometer

Procedure

1. Scoop up a panful of water from the pond, look at it under a microscope. Try to answer these questions.
    - A. What type of animal life do you see?
    - B. Where does this animal life fit in the pond food chain?
2. Scoop up some mud from the bottom of the pond, examine the vegetation and undersides of the water plants. Try to answer these questions.
    - A. Where do these organisms fit in the food chain?
    - B. What part of the food chain is eaten by these organisms?
    - C. What part of the food chain do these organisms feed upon?
3. Take a plant from the pond and examine it to see if any animals are feeding directly from the plant.
4. Examine the pond in relationship to the stream. How does the environment differ? Record all your findings on the data sheets.

Comparison of Pond and Stream Data Sheet

	POND	STREAM
Description of plant life		
Temperature of water in degrees		
Depth of water		
Description of animal life		
Description of soil		
Description of water movement		

Observations

Upon completion of activity, groups will assemble and share information and data. Complete your sheets and answer the following questions using the data.

Questions - A student should be chosen to lead these discussion questions.

1. How many different species of plants can you identify?
2. How is it possible that in a given area many different species can be found?
3. What kinds of plants are the tallest?
4. Are they one kind or several kinds?
5. Do these plants compete among themselves for sunlight and moisture?
6. Could these plants be considered dominant, predominant or subdominant?
7. How do these plants affect the growth of other plants in the community?
8. What plants were the most abundant?
9. Would they be considered dominant, predominant or subdominant?
10. How do these plants compete among themselves for sunlight and moisture?
11. How do these plants affect the growth of other plants in the community?
12. What plants make up the bottom cover of the community?
13. Would they be considered subdominant? Why?
14. What plant life grows the greatest distance apart? What plant life grows the least distance apart?
15. What plant life receives the greatest amount of sunlight? What plant life the least amount of sunlight?

16. Which plants need the greatest amount of moisture? Which need the least amount?

17. In what ways can a plant adapt to meet its demands from an environment? Did you observe any adaptations in the plants you studied?

18. In general, which plants survive in a community?

Conclusions

When questions have been completed, you will draw up a list of conclusions drawn from your observations of plant competition. These may be completed at school if time allows or taken home. Your teacher will tell you what to do with these conclusions the following day.

NOTE: To Teachers

If student activity sheets are deemed necessary for the science modules on pages 150 through 173 of the teacher's manual, they can be produced by individual teachers using the outline and questions listed in the teacher's reference manual; they include:

Comparing Plots in a Forest	Page 150
Streams Survey	Page 152
Succession on a Bare Rock	Page 158
Streams Profile	Page 162
Constructing a Cruising Stick	Page 165
Study of a Decaying Log or Stump	Page 169
Food Web in a Stream or Pond	Page 173
Line Transect Study	Page 177

Name of Activity - Plant Competition

Site Location - Jacobsburg State Park, Site

Equipment

- Data sheet
- Pencil
- Note pad
- Measuring tape
- Yardstick
- Masking tape
- Plant handbooks

Procedure

The teacher will divide the class into four groups.

1. Group A will identify as many plant and trees as possible using plant identification manuals. Count (an approximate number will do) and record each population number on data sheet. Determine the dominate, predominate and subdominate plants from these numbers.

2. Group B will measure and record the distances between the small plants having a diameter of 1" or less and height under 2'. After the group finishes the measurements, calculate the average and record.

3. Group C will measure and record the distances between plants having a diameter of 2" and height of 6'. Using the Merritt hypsometer and Biltmore stick for these calculations, calculate the average distance and record.

4. Group D will measure the distances between plants having a diameter of 16" and a height of 12'. Using the Merritt hypsometer and Biltmore stick, calculate the average distance and record.

5. All groups are to observe the amount of sunlight and moisture received by their particular groups of plants. The amounts are to be rated: good, fair or poor and recorded.

DATA SHEET I

Kinds of Plants	Number of Plants	Dominate Subdominate Predominate
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		
17.		

DATA SHEET II

Plants	Distance	Amount of Moisture	Amount of Sunlight
Dia. 1" Height 2'	______ Average		
Dia. 8" Height 6'	______ Average		
Dia. 16" Height 12'	______ Average		

Science

Name of Activity - Perculation Test

Equipment

1 watch (either a stop watch or a watch with a second hand)
1 one-lb. coffee can with both ends cut out of it.
1 one-pint jar or cup (so long as this container is the same size for everyone, it can hold any amount of water that is less than the coffee can would hold.)
1 plastic jug for carrying extra water

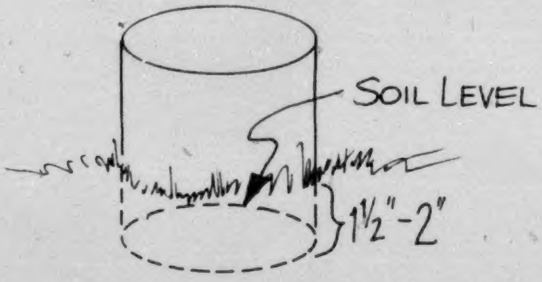
Procedure

Place the coffee can into the ground at the selected site so that water poured into it will not seep out from under the edge. (See Figure 1 below) All the can does is act as a sleeve. The lower edge should be pushed into the soil about one inch.

Measure one pint of water and pour it directly into the top of the coffee can.

Note and write down the time as soon as the water is poured in.

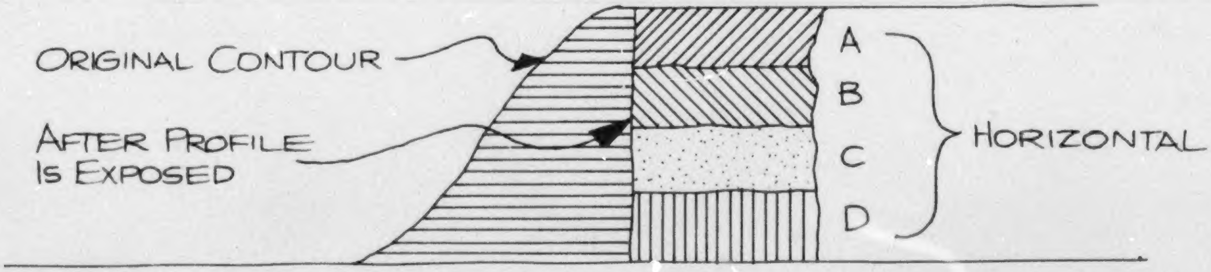
Note the time it takes for the water to disappear - write down the time. The difference in time is the perculation rate. (This may be very rapid or very slow depending on the soil type and condition.) You may want to see how long it takes for the water to drop one inch or two inches. As long as everyone does the same thing, it does not matter. You are finding the rate of perculation.



SOME WAYS TO MAKE A SOIL PROFILE

1. Side Hill Method

Find a side hill and dig straight down until profile is exposed.


ORIGINAL CONTOUR
AFTER PROFILE IS EXPOSED
A
B
C
D
HORIZONTAL

2. Auger Method

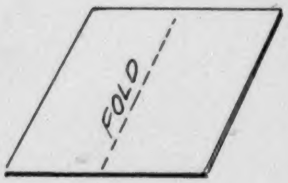
If you have a soil auger available, the following method may be used to make a profile.

Equipment - Poster board 9" x 22", white glue, soil auger

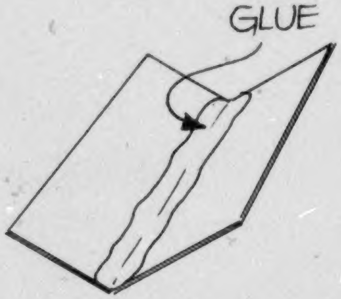
Procedure

A. Fold poster board along the long axis.
B. Cover middle fold with glue
C. Put soil samples on board as they are taken out of ground.
D. Press soil gently into glue and allow to dry for an hour or so.

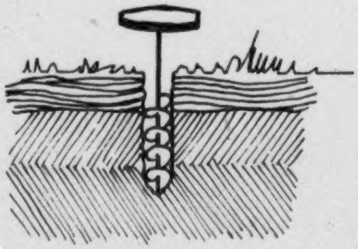
①



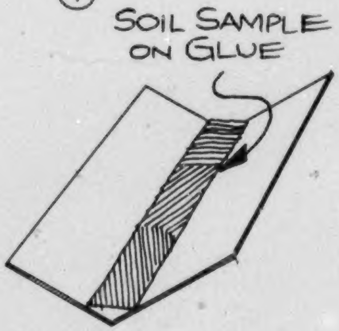
②



③



④


SOIL SAMPLE ON GLUE

DATA SHEET

1. Geological Activity occurring in the past

2. Type of Rock: (check one)
( ) Igneous ( ) Metamorphic ( ) Sedimentary

3. Substances identified in rock

A.
B.
C.

4. Summarize the physical history of the area.

5. Describe some physical characteristics of the soil.

6. Identify some physical factors alter the topography of the land and contribute to soil formation.

7. Identify some plants or animals which build or modify the soil and state the contribution of each.

8. Identify some physical factors which alter the lands' surface features.

9. List some physical factors which result from the surface features of the land that affect the types of plants and animals living here.

Name of Activity - Locating a Bee Tree

Site Location - Jacobsburg State Park

Statement of Problem - How to find a bee tree where man could get honey.

Equipment - Bait, piece of bark

Procedure - Place bait on bark and on the ground. Wait for bees to come to bait. When they have found bait and seem to be setting up a supply line, try to follow bees and see what tree they are going to. Bees will rise up from bait, circle twice and then head for the bee tree.

Questions

What sense is used the most in locating a bee tree?

Do you think patience is important in this activity?

Do you feel man has lost the ability to rely on himself since stores and supermarkets have become common? If so, how and why?

Discuss how man got the honey from the tree when located.

Name of Activity - Creative Writing in the Out of Doors

Site Location - Jacobsburg State Park, Sites

Statement of Problem

Use your acquired knowledge and imagination to write an exciting story about the things you have seen in the field and forest. Some examples of possible ideas follow:

1. Ants protect their home from human invaders.
2. Robin attacks worm.
3. Squirrels open branch office.
4. Rabbits stage an hoppening.

Equipment and Materials

- Pencils
- Paper (hard writing surface)
- Magnifying glass (optional)
- Camera (optional to record area activity took place)

Procedure

Explore the area, site or , for about half an hour. Record animals that are seen or evidence of animal presence (partly consumed food, excrement, homes, etc.). List food sources that may be used by animals.

Observations

1. What animals or evidence of animals was found?
2. What were the characteristics of the area?
3. How was it similar or different from what was expected?
4. Why is this area more or less desirable for animals to live in than another area?
5. Are the needs for survival present?

Field Assignment

Using your acquired knowledge and imagination, write an exciting story about your observations in the field and forest.

Extension - Use your imagination!

Do you know how the elephant got his trunk? A great writer named Rudyard Kipling imagined that once upon a time elephants' noses were almost as short as your's and mine. But one little elephant had an insatiable curiosity. He poked his nose into EVERYTHING. One day he put it much too close to an alligator's snout. The alligator thought the elephant would make a very nice dinner, so he grabbed the little elephant's nose and pulled and pulled and pulled. The elephant child pulled back but the more they pulled, the more the elephant's nose stretched. And that's how the elephant got his long and useful trunk. (He can brush flies off his back with his nose and pick delicate leaves from trees that are far out of reach of other animals.)*

Use your imagination. See how many stories you can make up about how the animals listed below got their distinctive features.

Skunk
Zebra
Camel
Pig
Giraffe
Octopus
Leopard
Penguin

*Taken from Life Cereal box (Quaker Oats Company)

Name of Activity - Using your senses

Site Location - Jacobsburg State Park - Sites
Can also be adapted for any wooded area or park.

Statement of Problem - How to utilize your senses to their fullest potential.

Equipment - Type of earphones or other means of blocking out hearing, blindfold, tape recorder, pencil and paper, clipboard, rope and stick, blackboard, poster paper, experience chart, dictionary, knapsack, camera, records of bird calls and other sounds of nature.

Procedure - With the experiences that will be obtained in the park, you will be blocking out one or more of your senses at a time and trying to carry on normal activities. You will then have to resort to one of your other senses to compensate for your loss. You will have the opportunity to express your reactions to this experience through different language arts projects.

Questions

1. How does the loss of hearing, seeing, talking, touching, smelling or tasting affect you?
2. What causes the sounds? Can anything be done to correct the sounds? (polluted sounds)
3. Why are the sounds pleasant or unpleasant?
4. What can be done at home to take care of the noise?
5. Where do you think it is best to run and shout?
6. How does it feel to have to depend on another to lead you around?
7. Can you now see that sometimes you take your senses for granted?
8. Did your experiences help you understand the needs of others. If so, why?

Language Art

Name of Activity - Woodland Word Hunt

Site Location - Any woods, field or nature area

Statement of Problem - How can word puzzles be made from the names of woodland plants and animals?

Equipment - Paper and pencil, nature identification guides, dictionary, thesarus

Procedure

1. Identify various living things in the area (use field guides).
2. Use names of plants and animals to make puzzles.
3. See if friends can solve your puzzle.

Observation

1. Try to solve puzzles about living things.
2. Examine types of word puzzles that could be used; acrostics, rebuses, crossword puzzles, word scrambles, hidden words, cryptograms, etc.

References

Puzzles and puzzlers, J. Weston Walch, Portland, Maine Publisher

Peterson Field Guides Series

Golden Nature Guides

Art

Name of Activity - Nature's Patterns

Site Location - One of the main trails your teacher tells you to use.

Statement of Problem - How many shapes and patterns can you find in those things in the park?

Equipment

Log Sheet
Pencil
Cardboard
Binoculars or magnifying glasses (for your group)

Procedure

Slowly walk along the trail. Look at all the leaves, flowers, animals, trees, etc. Look at parts of them; look at the whole thing. Decide which shapes they fit. Write the name on your log sheet or draw a picture of the things which fit each shape. Try to find three examples for each shape.

Questions

1. What other shapes did you find besides the ones given to you?

2. Did all the trees have the same shape? What were some differences?

3. Did all the flowers have the same shape? What were some differences?

4. Which shape was the easiest for you to find?

Name of Activity - Experimenting in Natural Colors

Site Location - One of the main trails that your teachers tells you to use.

Statement of Problem - How many different colors can you find just using things found in the park?

Equipment

12" x 18" white drawing paper folded into eight sections
Pencil
Piece of cardboard to use as a drawing board

Procedure

As you walk along the trail, try to choose eight things that will make different colors as you rub them. Put one rubbing in each box. Don't forget to label each rubbing. Tell from where you got each one - what kind of berry, leaf, flower or dirt.

Questions

1. Are the color of the things you rubbed and the rubbings always the same?
2. What color are most of your rubbings?
3. Can you think of any reason why early settlers' cloth was usually of a brown or green color?

Name of Activity - Colors can be used in camouflage.

Site Location - Jacobsburg State Park

Statement of Problem - To be able to see why certain animals have a certain color.

Equipment and Materials

Crayons or colored pencils
6 x 8 File cards

ACTIVITY PROCEDURE

1. Walk through the park and find examples of camouflage.
2. Draw two or three organisms somewhere on the card.
3. Fill in background that will make the organism hidden.
4. Don't let anyone see your finished product.
5. Put name on back of cards and pass them in to the teacher.

OBSERVATIONS

Take finished card back to the teacher for use in classroom game.

QUESTIONS

1. Is there any relationship between plant and animal life as to color?
2. Do dark, dreary colors always mean something negative or can you find beauty in them?

Name of Activity - Color and Environment

Site Location - Jacobsburg State Park

Statement of Problem - To appreciate color in our environment.

Equipment and Materials

Pencil
Paper for Chart

Activity Procedure - Make a chart

	Flowers	Animal	Bird	Color	What the Color Does
1.		rabbit		brown	blends in with environment for protection
2.					

Observation

Compare the two charts - man-made at school and the one from Jacobsburg State Park.

Questions

1. What is the season?
2. Can you tell the season by the colors around you?
3. What is the condition of your surroundings?
4. Does the coloration give you a clue to the preceding answer?
5. Did the surrounding coloration make you feel happy or sad?
6. Are the things you like best in the color you like best?

Name of Activity - Animal Tracks

Site Location - Jacobsburg State Park

Statement of Problem - To be able to locate and identify animal tracks.

Equipment and Materials

Paper Cups
Plaster of Paris
Spoon
Paint brush
Water

Activity Procedure

1. Find animal tracks.
2. Place a circle around tracks. This can be done with the paper cup - cut off 2" from the top of the cup.
3. Mix plaster of paris with water to get a thick, creamy consistency. This will keep the mixture from spreading too far.
4. Carefully pour the mixture into the circle and completely cover it.
5. Wait half an hour or an hour for mixture to cool and harden.
6. Very gently lift the casting and carefully clean with brush. This is a negative cast.

Observations

1. Compare negative cast with original tracks.
2. Are they the same?
3. Carefully take negative cast back to school.

Questions

1. Are all the traces made from the same animal?
2. Do you know the animal that made these tracks?
3. Can you tell what the animal might be doing when he made these tracks?

Name of Activity - Experience in Perspective

Site Location - Jacobsburg State Park - Two fireplaces with chimneys

Statement of Problem - To show how perspective can be drawn and the different degrees of perspectives.

Equipment and Materials

- Pencil
- Papers
- Erasers
- Ruler

Activity Procedure

1. At Jacobsburg State Park, you will find two fireplaces with chimneys. This will make a good object to use in drawing perspectives.
2. Start with one-point perspective directly in front of fireplace.
3. Two-point perspective - use one of the corners.
4. Three-point perspective - use an angle.

Observations - All things can look different from different angles.

Questions

1. Do I really understand the three perspectives?
2. Can I always find the vanishing point at the point where it should be?
3. What is the advantage of this knowledge?

Name of Activity - Experience in color.

Site Location - Jacobsburg State Park

Statement of Problem - How different medias can be used to express color designs.

Equipment and Materials

A clipboard or cardboard to be used as a drawing board
Two pieces of white construction paper
Box of 48 crayons with different shades
Paint box with 8 colors so colors must be blended
Chalk
Mushrooms of the World by Lucuis VonFrieden
Hand lens

Activity Procedure

1. Look for mushrooms along the main path.

2. Sketch it first in a white or plain color until you are happy with its shape.

3. Fill the sketch in with the correct color trying to match it as closely to the real color of the mushroom.

4. Continue doing this until you have a variety of art work.

Questions

1. Does it only have one color?
2. If it has more than one color, what is the relationship to the other color?
3. Can you see more colors using the hand lens?
4. Can you find any spores on the underside of the cap? Are they a different color?
5. What part of the plant is the spore? (The part that is above the ground is really the fruiting part that bears the spores.)
6. Why is this one more colorful than that one?
7. Does the background color or surrounding colors have any relationship to the color of the mushroom?
8. Does it do anything for it?
9. Did I achieve the effects of the media that I wanted?
10. Does my mushroom look like those in the park?
11. Did I remember to use my media (crayon, chalk or paints) as I was taught?

Name of Activity - Taking a good scene photograph in a natural environment.

Site Location - Optional

Statement of Problem - Locate a site which contains as many "concepts" as possible (good scene site).

Equipment and Materials

Camera
Binoculars

Activity Procedure

1. Using your hand binoculars, search the area for good "scene" sites.
2. Once you find a site of good scenery, mark it with a flag (tape, cloth, etc.).
3. Answer the questions below.
    - A. How many concepts does your scene contain? If your site does not contain at least six concepts, go back to Step 1.
    - B. Are any of the "concepts" more dominant than others?
    - C. If so, are any concepts too dominant? If yes, go back to Step 1.
4. Take a photograph of the site.
5. Report back to the teacher.

Optionals - If darkroom facilities are available, developing your own pictures can be a rewarding experience.

Students' References - The local library has numerous books on "art appreciation".

Name of Activity - Taking photographs of "art concepts"

Site Location - Optional

Statement of Problem - Locate a site where "your" concept is dominant.

Equipment and Materials

Handmade binoculars
Camera

Activity Procedure

1. Using your handmade binoculars, "search" the assigned area for your concept.

2. Once you find your concept, mark the site with a flag (tape, cloth, etc.).

3. Answer the questions below.

    A. Is your "concept the only one you can see at your site?
    B. If there are other concepts, is your concept dominant?
    C. Is the angle of your photograph proper?
    D. Is there enough light?
    (If not, go back to Step 1 and start over.)

4. Using your own camera or your teammate's, take a photograph of the site.

5. Report back to the teacher.

Optionals - If darkroom facilities are available, developing your own pictures can be a rewarding experience.

Students' References - The local library has numerous books on "art appreciation".

Name of Activity - The Maze

Site - Hemlock Stand

Problem - Each group of four should try to find a way out of the maze while being silent, and blindfolded.

Equipment - 100 yds. of rope or string to construct maze. This should be done by a non-participant.

Activity Procedure - After deciding how your group of four would like to attack the problem, you will be blindfolded, led into the maze, and be left to return.

Questions

1. What were your feelings inside of the maze?
2. Did you depend on others? Why?
3. When have you felt this dependency before?

Name of Activity - Feelings from natural and man-made environments.

Site Location - Anywhere

Problem - You are influenced by your surroundings. How can a group of pictures be used to show peoples' feelings regarding where they are?

Equipment - Camera, film, pencil, paper, cardboard

Activity Procedure - Make a 3" x 5" frame of cardboard. Use this to take mock pictures. After feeling what places you think have an impact on people, try to develop a group of pictures which might get this feeling impressed on other people through a group of slides.

Name of Activity - Leaf Drawings

Site Location - Any place where leaves are found.

Problem - A leaf is an intricate object.

Equipment - Pencil and paper.

Activity Procedure - It is necessary to find models for drawing the vein network of a leaf. If it distresses you to pull a leaf from a tree, because of being something living, you can use leaves as live models.

This drawing should be undertaken with a keen eye for the many angles made by a leaf. The system of veins not only provides the leaf with its necessary nutrients, but forms the pattern of the leaf itself.

Name of Activity - Construction and design of a shelter.

Site Location - Jacobsburg or any available site.

Problem - There are money, beauty, political and social influences which affect peoples' housing and location of housing.

Equipment - Material such as pencils and paper which can be used to design a shelter.

Activity Procedure - Describe a suitable place to build a shelter. Tell how many would influence your home and place for building.

1. How would your location influence your home?
2. What must be considered if the home is placed "away" from developed land?
3. What kinds of personal requirements do you have for your shelter?
4. How does climate affect the designed home?

After money, beauty, governmental and social factors have been considered, a design of your shelter is necessary. Also included with the design should be a statement of needs for surviving in such a location in your type of shelter.

Name of Activity - Modeling of an organism influenced by soil, air, water and light.

Site Location - Jacobsburg, any area where soil, air, light and water are found.

Problem - What can be done to show how these four "elements" affect plants and animals?

Equipment - Anything that can be used to show these four "elements" together along with another component, preferably, living.

Activity Procedure - Identify places where these four "elements" are found together.

1. Is such a place a window sill?
2. How can you make a window sill such a place?
3. What would you use to hold water and soil?
4. Can a place be found out of shelter where these four "elements" are found?
5. What would happen to a "junked" car at this site?
6. Can a drawing be made using soil, air, water and light as main parts of the drawing?
7. Would this picture look "real"?

Name of Activity - Constructing a fresh water environment.

Site Location - Jacobsburg State Park (creek and stream) small ponds.

Any area where water is available.

Problem - What are the differences seen in aquariums in stores and a stream or pond?

Equipment - Container for water, filtering system, plant and animal life, thermometer, pencils, and plain white paper.

Activity Procedure - The steps to this activity are simple. In order to model a water environment, it is necessary to see what one looks like. Observations are most important. After picking a spot to look at, you should try to see what is there. Draw what you see. It does not have to be elaborate. After drawing what you have seen, you should try thinking of how you can put those pieces together in a container to live and grow.

Questions

1. What importance does light play in this model?
2. Is there a relationship between plants and animals?
3. What kind of bottom is present?
4. Can you draw a picture of temperature?
5. What does hot or cold have to do with your model?
6. How does the stream get oxygen?
7. How will your model get oxygen?

References

Any library or pet shop can give information regarding aquatic environments. The Pennsylvania Fish Commission will issue a permit giving your teacher the opportunity to collect fish for your models.

Name of Activity - Elevating four people from the ground for one minute.

Site Location - Any level, soft spot.

Problem - Construct, after planning together, a stand from three branches and a rope that will hold four people off the ground for one minute. You will be allowed fifteen minutes for planning and construction.

Equipment - Three 12' long, 6" diameter branches and 50' of 1/2" diameter rope.

Activity Procedure

Groups of four. Plan a device in fifteen minutes to hold your group aloft for one minute.

Name of Activity - Learning about texture in trees

Site Location - Jacobsburg State Park - on the main path, past the Hemlock Forest to the main road and up to the Henry Estate.

Statement of Problem

1. To know about texture in trees is helpful in appreciating the beauty of trees.
2. To know about texture in trees is helpful in learning how to identify trees.

Equipment and Materials

Crayons
Manilla paper
Soft pencil
Clay
Clipboard or file folder

Activity Procedure

1. Walk on the main path past the Hemlock Forest to the road and up to the Henry Estate.
2. Do texture rubbings of bark from different trees in the Park and on the Henry Estate.
3. Do texture rubbings of leaves (find leaves on the ground and return them to the ground). Nothing is to be removed from the Park.
4. Look at the clay bank at the site right off the main path.
5. Using clay which you brought from school, make imprints from the bank on different trees.

Questions

1. What differences do you see between the texture of the bark of different trees?
2. What differences do you see between the texture of the leaves of different trees?
3. How will these differences help in learning about different kinds of trees?

Questions

1. What were you feeling when you were blindfolded?
2. What were you thinking about when you were blindfolded?
3. What did you hear when you were blindfolded?
4. What did you smell when you were blindfolded?
5. Why do you think we used blindfolds in the forest?
6. What were you thinking about when you were lying on your back in the forest?
7. How were you feeling when you were lying in the forest?

Post Activities

1. Exchange experiences with your classmates.
2. Draw pictures about what was most pleasing to you on your trip to the Park. Was it a feeling you had or something you thought about while you were lying in the forest? Draw this. Was it an especially beautiful tree you saw? Draw this. Use your imagination. It is not necessary to draw something real.
3. Using your rough sketches to copy from, draw or paint other pictures more carefully.

Name of Activity - Using your senses of hearing, touch, smell and sight in the forest.

Site Location - Jacobsburg State Park - the main path to the Hemlock Forest and beyond to the road.

Statement of Problem - To become aware of the beauty of trees through the use of your senses: hearing, touch, smell and sight.

Equipment and Materials

- Blindfold
- Clipboard
- Sketching Paper
- Crayons
- Soft pencil
- Homemade binoculars

Activity Procedure

1. Walk on the main path to the Hemlock Forest.
2. Sit in a circle and look around.
3. Your teacher will blindfold you.
4. Listen to what your teacher tells you to do. Be very quiet.
5. After the blindfold has been removed, lie on your back and look up through the trees.
6. Write down what you were thinking; how you felt, what you saw, smelled and heard.
7. Draw rough sketches about what you were thinking, how you felt, what you saw, smelled and heard.
8. Continue walking through the forest. Stop to look at different trees through your binoculars.

Name of Activity - Learning about line and shape in trees

Site Location - Jacobsburg State Park - Main path past the Hemlock Forest, on to the road and up to the Henry Estate

Statement of Problem

1. To know about line and shape in trees is helpful in appreciating the beauty of trees.
2. To know about line and shape in trees is an aid in helping to learn how to tell one kind of tree from another.

Equipment and Materials

Manilla paper
Colored chalk
Crayons
Soft pencil
Heavy watercolor paper
Clipboard

Activity Procedure

1. Walk on the main path past the Hemlock Forest, on to the road, and up to the Henry Estate.
2. Look for line and shape in trunks, branches, leaves and roots that stick out.
3. Make rough sketches of different trees.
4. Pick out and examine different leaves to compare line and shape.
5. Make leaf rubbings of leaves (pick up leaves and return to the ground; nothing is to be removed from the Park)
6. Make a texture rubbing of the tree stump at the Henry Estate.
7. Dip heavy watercolor paper in the creek, using colored chalk to sketch a tree.
8. Trace leaves.

Questions

1. What differences do you see in the lines and shapes of different parts of trees?
2. What do you think caused the circles in the tree stump?

Post Activities

1. Make leaf patterns using leaf tracings from the Park.
2. Use leaves from leaf tracings, texture rubbings of leaves, bark and the stump and yarn to make a collage
3. Use leaf rubbings or tracings, yarn and a coat hanger to make a mobile.
4. Make foil prints using newspaper, leaves (from around the school) and aluminum foil. Place the leaf between newspaper and aluminum foil and rub over with a rolling pin or glass.
5. Do a crayon resist drawing.
6. Draw new pictures from rough sketches you did at the Park.
7. Decorate napkins or stationary with texture rubbings.
8. Draw a family tree with roots, trunk, and branches. Write your grandparents' names on the roots, your parents' names on the trunk and you and your brothers' or sisters' names on the branches.